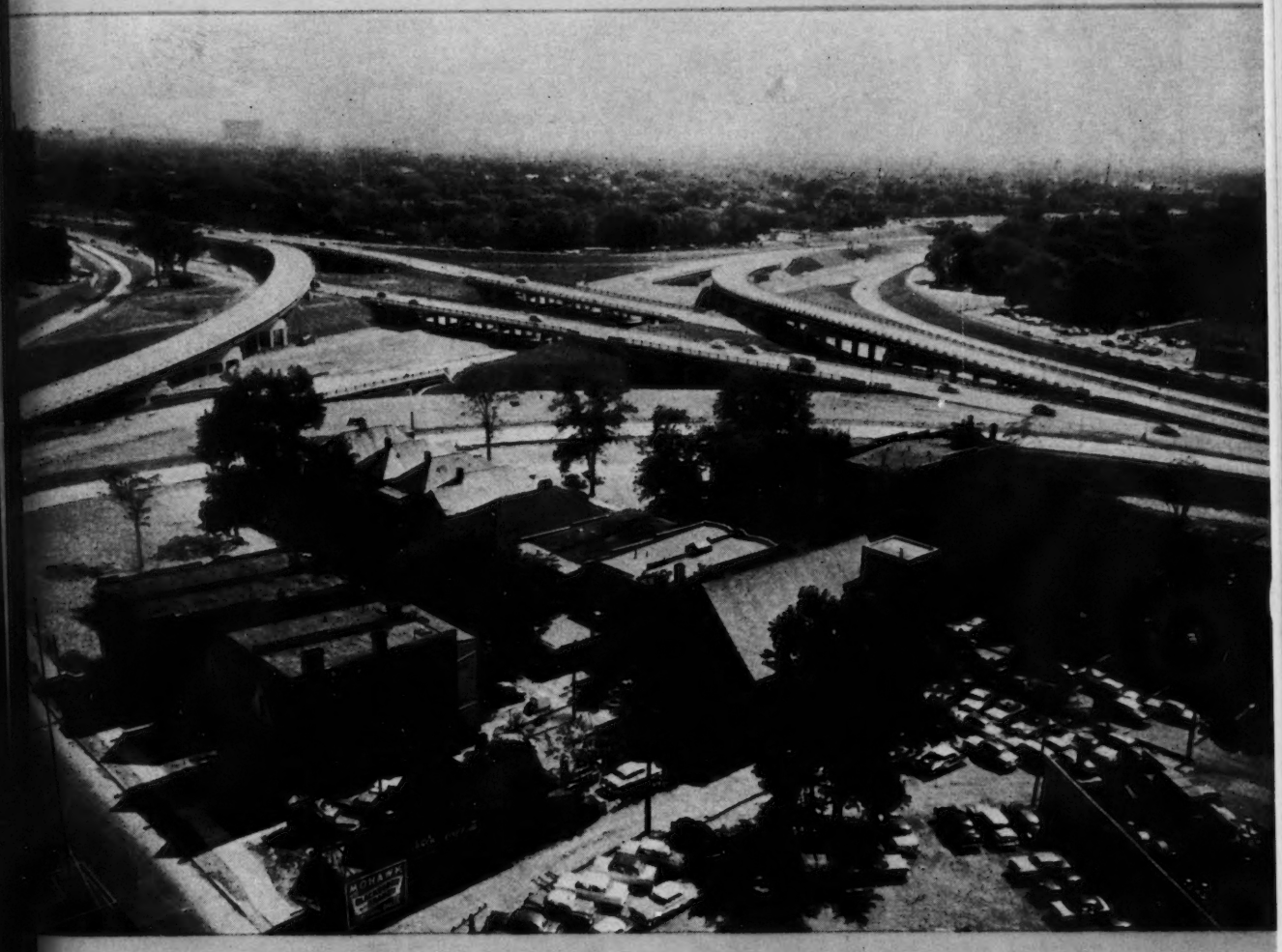
SEPTEMBER, 1957

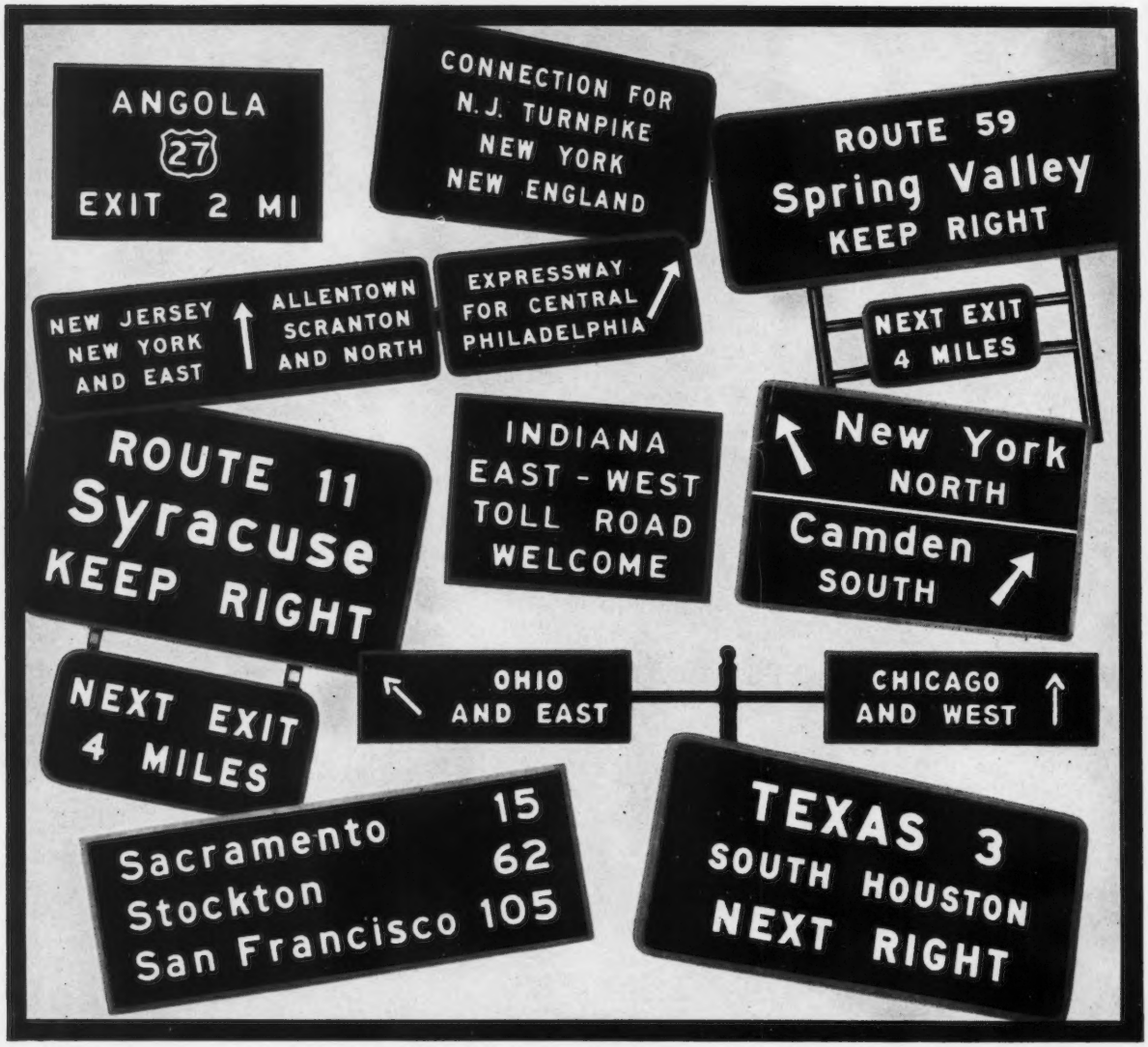
TRAFFIC ENGINEERING



CONVENTION ISSUE

INSTITUTE OF TRAFFIC ENGINEERS
ITE
FOUNDED 1930

27th Annual Meeting
September 23-26, 1957
Detroit, Michigan



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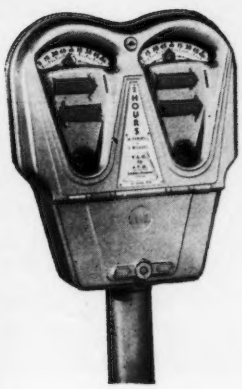

The largest single installation of parking meters in Canada is taking place in Vancouver, B. C. Naturally, a wide selection of meters was exhaustively tested for economy and performance—the unanimous decision was for Dual Parking Meters.

In cities all over the world, performance records prove that the best investment in metered traffic control is Single and Dubl-Dual Parking Meters. Their Swiss watch-like precision combined with the rugged durability of stainless steel casings and solid brass gearing is your assurance of longer life, lower cost and greater revenue per meter.

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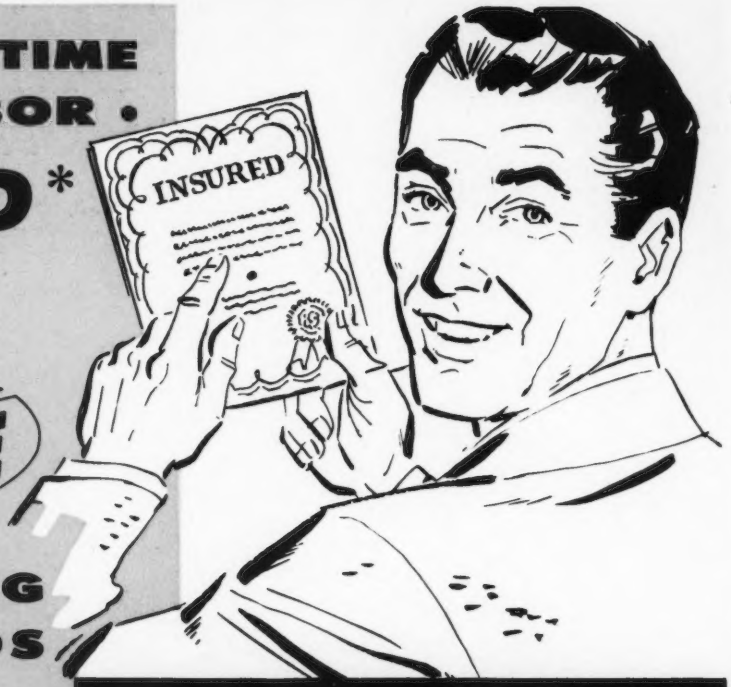

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Solve your reflectorizing problems with new Flex-O-Lite Free Flow Glass Beads. Proof of their superior qualities is evidenced by consistent use in several states and in many cities throughout the nation. A trial order will convince you of their high quality . . . superiority born of the "know how" and facilities of the country's dominant producer of reflective glass beads.

●

New Flex-O-Lite "Free Flowing" Bead Dispenser

Field tested for two years with over 600,000 lbs. of beads. Works equally well with standard type "A" beads, "Free Flow" beads or moisture-resistant type "C" beads. A positive action, precision-built bead dispenser for municipal and highway use. Rugged cast aluminum construction. Completely automatic or may be manually operated.

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2. Flow freely through dispensing equipment
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5. Offer perfect adhesion to any suitable traffic bead binder

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TRAFFIC ENGINEERING

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

Vol. 27 SEPTEMBER, 1957 Number 12

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COVER: The intersection of the John C. Lodge and Edsel Ford Expressways in Detroit.

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Take the first step to SAFETY

...reflectorize traffic signs with *Cataflex 202* reflective finish

Should she step off the curb? Has the approaching motorist seen the stop sign?

Used to be a lot of accidents at this intersection. That was before the men responsible for traffic control found out about "Cataflex 202" Reflective Finish—made by CATAPHOTE, leader in the field of non-electric traffic control products.

Now this is a safe intersection. The stop sign is clearly visible at night, giving the motorist hundreds of extra yards . . . valuable extra seconds in which to hit the brake.

"Cataflex 202" Reflective Finish makes a smooth finish, weather and water proofed, dirt proofed, durable, reflecting surface on the completed sign. Yet it is an easy, do-it-yourself method that requires no special tools nor special training. The result . . . brilliant reflectorized signs at 1/10 the cost of other methods.

Every day more and more street and highway officials are putting their traffic control problems in the hands of CATAPHOTE because they know that CATAPHOTE is backed by over 26 years of specialized experience.

We invite you to investigate the advantages of the following traffic control products by CATAPHOTE:

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Frankly Speaking . . .

ONE OF THE DEFINITIONS given for the term "Convention" by Webster indicates that it may be a meeting of several persons in the same field for the purpose of accomplishing a lofty objective. In a very real sense, this meaning can be applied to the 1957 ITE Convention which will open in Detroit, Michigan on September 23. The theme of the Convention will be "The Highway of Tomorrow Is Our Job Today." It was hoped that the development of this idea through discussion and conference during the several meetings will serve to raise the sights of the traffic engineer so that he will see beyond the routine day-to-day problems which tend to mire him down. The discussion topics and the subjects for panel treatment have been selected with a view to giving the traffic engineer an even greater interest in and appreciation of his profession. I am confident that the speakers who have accepted invitations to participate will stimulate every member to greater efforts and achievement. A glance at the technical session phase of the meeting is sufficint to confirm this belief.

Realizing that any good convention program should be well balanced, the various Convention Committees have worked out plans to complement the technical phase. Field trips planned in cooperation with the Automobile Manufacturers Association will be interesting and instructive. The social program, both for members and their wives is planned to provide pleasant relaxation.

A few innovations are being introduced into the general convention program this year. We hope you like the changes. We can assure you that everything was planned for your added interest and enjoyment. We hope each of you with your wife will join us in Detroit September 23 through the 26th.

J. CARL McMONAGLE,
President

Why reflectorize both legend and background?

For years, traffic signs were put out where motorists could find them. Today, with the ever increasing volume of both day and night travel, many traffic engineers say that's not enough.

They say the sign should be placed where the motorist *does not have* to look for it. The sign must be seen, and it must be seen easily and clearly a full 24 hours every day.

To give motorists the day and night assistance of really effective traffic signs, signs should call for attention with commanding impact. Such signs show true shape, color and legend at any hour, in any weather, from any angle of approach. You get this kind of impact only from a sign reflectorized over-all with "Scotchlite" Reflective Sheeting.

⅔ of the message is left to nighttime driver's imagination by a sign with reflective legend alone. It must be read to be recognized.

A new look at shape and color

By day, when most traffic hazards are visible, the mere presence of a sign serves to emphasize a road condition ahead. But at night, when the driver can only see as far as his headlight beam, the sign is his *only* indication that there is a curve, an intersection or a change of direction ahead.

A motorist, travelling 50 miles-per-hour down a dark road can't wait to look for the sign. He may miss it, in fact, unless he can see it easily from far down the road. That's where reflective color and shape come in.

A sign with its background in vivid reflective color naturally shows its shape. Through these two characteristics alone, the nighttime driver can tell what kind of condition is coming up even *before he can read the legend*. He *sees* the sign without looking for it. It almost "looks" for him.

Then comes legend

Because the sign caught the driver's eye with the commanding authority of reflective shape and color, the driver, then, is ready for your message when he can read it . . . and the distance at which he reads it depends, generally, on the sign size itself.

Fast identification at night

Only fully reflective traffic signs give you the fast nighttime identification you want. They show all of the three sign elements that traffic engineers long ago decided were necessary to communicate effectively with the driver. A sign, on the other hand, with reflective lettering alone, can do only one-third of the job.

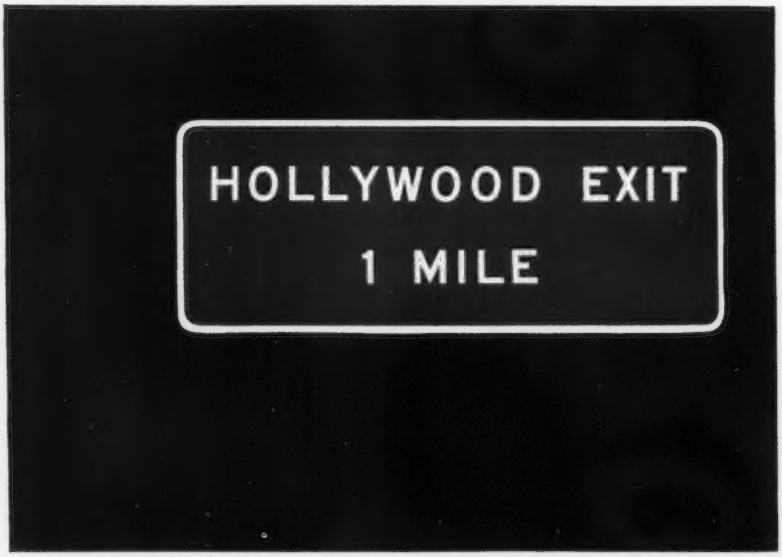
The big directional sign above is an example of the value of full reflectorization. The motorist sees it from way down the pike . . . and the old scramble for position to make the turn now becomes a confident, safe maneuver. Warning and regulatory signs work in the same way.

Full-time safety

For full-time safety you need full-time performance. And no other traffic sign material gives you such steady day and night performance as Wide-Angle Flat-Top "Scotchlite" Reflective Sheeting. These vivid signs are always on the job. Foul weather does not black out their bright warning . . . and with their extremely wide angle visibility you can place each sign right where it ought to be.

* * *

Why not get more details on the value of full-time safety with reflectorized backgrounds of "Scotchlite" Sheeting from your 3M Representative? Or, for further information, write: 3M Company, Dept. GS-67, St. Paul 6, Minnesota.



A full-time sign of "Scotchlite" Sheeting shows all three elements—shape, color, legend—as well by night as by day. Motorist gets full impact of the sign's purpose in time to react safely.

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PRODUCT OF 3M COMPANY RESEARCH

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27th ANNUAL MEETING
PROGRAM

Statler Hotel, Detroit, Michigan

September 23-26, 1957

Sunday, September 22

2:00 p.m.- 5:00 p.m.
Registration Desk open

5:00 p.m.- 7:00 p.m.
Hospitality Suites open

Monday, September 23

8:00 a.m.- 9:30 a.m.
National and Section Officers Joint Meeting

9:30 a.m.-11:45 a.m.
Technical Council Meeting
Technical Committee Meetings

12:00 noon
Kick-off Luncheon
Presiding Officer: J. C. McMonagle
Welcome to Detroit—Albert E. Cobo, Mayor
Welcome to Michigan—
G. Mennen Williams, Governor
Remarks—John C. Mackie,
State Highway Commissioner

2:00 p.m.- 4:30 p.m.
First Technical Session
Presiding: Matthew C. Sielski
Digest of Past President's Award Paper
Digest of Matson Memorial Award Paper
Annual Report of Technical Council
Adjourn to separate rooms for Technical Department Meetings.

4:30 p.m.- 7:00 p.m.
Hospitality Suites open

7:00 p.m.- 9:00 p.m.
Dinner Hour

9:00 p.m.- 1:00 a.m.
A.R.B.A. Committee will be host to the entire convention at a Gala Get-Acquainted Party in the Grand Ballroom.

Tuesday, September 24

7:00 a.m.- 8:45 a.m.
Breakfast hour open for Section Meetings by individual arrangement.

9:00 a.m.- 11:30 a.m.
Second Technical Session
Presiding: George W. Howie
Speakers:
The Highway Safety Study
C. W. Prisk, U. S. Bureau of Public Roads.
Research as Applied to Traffic Engineering—
Dr. Lawrence R. Hafstad, Vice President for Research, General Motors Corporation.
Public Relations in Traffic Engineering—
Mrs. Lee K. Jaffe, Director of Public Relations, Port of New York Authority.

11:45 a.m.
The Automobile Manufacturers Association will be host to the entire convention at luncheon in the Grand Ballroom. George Romney, President of American Motors Co., will speak.

1:30 p.m.- 4:30 p.m.
The Automobile Manufacturers Association will be host to the entire convention on a guided tour of some of the automotive manufacturing facilities of the Ford Motor Co.

4:30 p.m.- 7:00 p.m.
Hospitality Suites open

7:00 p.m.- 9:00 p.m.
Dinner Hour

9:00 p.m.- 1:00 a.m.
I.T.E. Suppliers Committee will be host to convention at "Open House" in Headquarters Room.

Wednesday, September 25

7:45 a.m.- 9:00 a.m.
Biscuit Banter Breakfast
Presiding: Harry Porter, Jr.
Program by: H. S. Simpson, W. E. DeYoung, and D. G. Mickle.

9:15 a.m.-11:30 a.m.
Third Technical Session
Presiding: Gordon K. Gravelle
Speakers:
Design Standards for Tomorrow—Charles M. Noble, Director of Highways, State of Ohio.
What Highway Users Expect from Traffic Engineering—Russell E. Singer, Executive Vice President, American Automobile Assn.
Electronic Equipment in Traffic Engineering — J. Douglas Carroll, Director Chicago Metropolitan Area Traffic Study.

11:45 a.m.
Alumni groups will hold luncheons by individual arrangement.

1:30 p.m.- 4:30 p.m.
The Automobile Manufacturers Association will conduct a guided tour through the General Motors Technical Center, and the new Plymouth plant.

4:30 p.m.- 7:00 p.m.
Hospitality Suites open.

7:00 p.m.- 9:00 p.m.
Dinner Hour

9:00 p.m.- 12 Midnight
Informal entertainment in the Headquarters Room by Convention Entertainment Committee.

Thursday, September 26

9:00 a.m.- 12:00 Noon
Annual Business Meeting in Wayne Room.
Presiding: J. C. McMonagle

12:00 noon
Past presidents and national officers convene for private luncheon.

2:00 p.m.- 4:30 p.m.
Fourth Technical Session
Presiding: George J. Fisher
Speakers:
The Traffic Engineer in Over-all Planning — Henry Sullivan, President, American Society of Planning Officials.
What the Public Expects of the Traffic Engineer— Wm. S. Lampe, Editor, Pittsburgh Sun-Telegraph.
Manpower, In-Service Training and Professional Education—Panel discussion. Panel Members: Professor Ellis Danner, University of Illinois; Professor Donald S. Berry, Northwestern University; George Grant, Commissioner of Roads for Metropolitan Toronto; Robley Winfrey, Bureau of Public Roads.

4:30 p.m.- 7:00 p.m.
Hospitality Suites open

7:00 p.m.- 8:00 p.m.
Annual Cocktail Party

8:00 p.m.- 9:30 p.m.
Annual Banquet
Toastmaster: A. F. Malo

9:30 p.m.- 1:00 a.m.
Floor show and dancing

LADIES PROGRAM

Monday, September 23

MORNING
Open

NOON
Attend Kick-off Luncheon

AFTERNOON
Party in Michigan Room
Hostesses:
Mrs. T. B. McCarthy
Mrs. A. F. Malo
Mrs. J. C. McMonagle

Program:
1. Travelogue on Michigan
2. Card Party
3. Award Door Prizes

EVENING
Attend Cabaret Party in Ballroom.

Tuesday, September 24

MORNING
Field Trip—Windsor (via tunnel and bridge) and Detroit

NOON
Attend A.M.A. Luncheon

AFTERNOON
Attend A.M.A. Field Trip

EVENING
Attend Open House Party in Michigan Room

Wednesday, September 25

MORNING
Field trip around Belle Isle and Grosse Pointe Area

NOON
Luncheon at Eastland

AFTERNOON
Style show and shopping at Eastland

EVENING
Open

Thursday, September 26

11:00 a.m.
Brunch at Devon Gables (Host: Automobile Club of Michigan)

12:30 p.m.
Field trip to Cranbrook Area, and return via Northland

EVENING
Attend Annual Banquet

Social Activities at Detroit Meeting

The Detroit Annual Meeting Committee has proposed a change in Annual Meeting procedure and they hope the entire membership of the Institute will join in making it successful. In its simplest terms, the new procedure calls for planned entertainment each of the four evenings of the meeting—*planned for the entire membership.*

As you will see by looking at the program, activities are scheduled for the Headquarters Room on Monday, Tuesday and Wednesday evenings. The Annual Banquet is scheduled for Thursday evening. Groups of Sustaining Organizations and other vendors have agreed to sponsor the social activities on Monday and Tuesday evenings, and the Convention staff has planned the activities for the Headquarters Room on Wednesday evening.

By mutual agreement, all vendors maintaining hospitality suites in the hotel have agreed to limit their operations to the 2½ hour period from 4:30 in the afternoon to 7 o'clock in the evening. At 7 o'clock, they will expect their guests to depart for dinner. At the same time, they will not want to embarrass any member or guest, and it is therefore up to Institute members to cooperate fully with this time schedule.

The Detroit committee feels that the interests of the Institute will be better served by the type of social program they have planned, and they ask your cooperation. In this request, they are joined by the National Officers and Directors.

Detroit reports on . . .

Ten Years of Traffic Engineering

by Ross C. Harger
Assistant Director
Department of Streets and Traffic
Detroit, Michigan

In the fall of 1947 the Annual Meeting of the Institute of Traffic Engineers was held in Detroit. Now, ten years later, the group is again returning to this city.

Normally, ten years seem like a short time, but in this fast growing business of traffic engineering much can happen in a decade. As a matter of interest to ourselves, we started gathering together information on just what had transpired during this ten-year period, and it then occurred to us that possibly this might be of interest to ITE members, especially those who were here in 1947 and might like to compare what they saw at that time with the type of traffic controls that are being used today. This may also induce reflection on the part of some of the other traffic engineers. The changes that have taken place are not only revealing, but in some cases actually amazing.

Probably the greatest advance in traffic administration in Detroit came in 1951 as a result of a study and recommendations made by the Automotive Safety Foundation, and directed by our good friend Grant Mickle. The report recommended that all functions having anything whatsoever to do with the planning or control of traffic should be concentrated in one department with all the power and authority necessary to permit the Department to do the required job. In the fall of 1951 the voters approved a charter amendment which abolished the old Traffic Engineering Bureau and established the new Department of Streets and Traffic with full departmental status. All personnel including the Director are under Civil Service. The staff is responsible to a four-man commission appointed by the Mayor to staggered four-year terms. Incidentally,

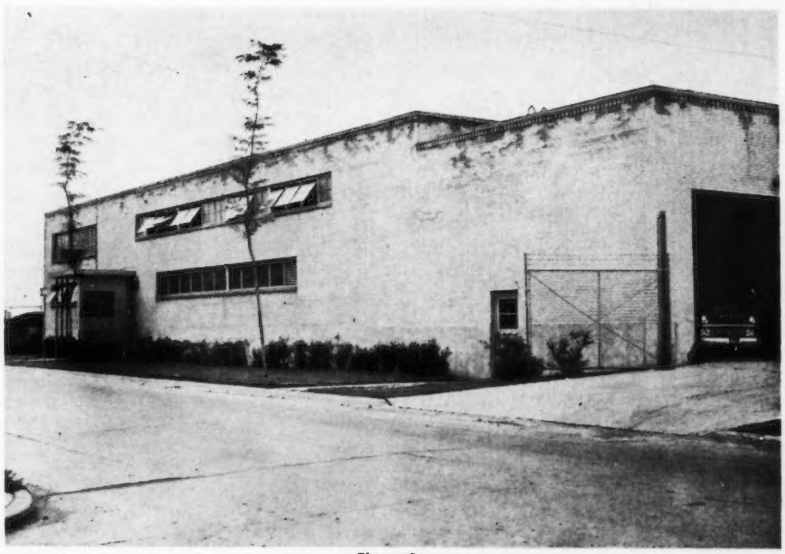

Figure 1a
New Traffic Sign Shop

Figure 1b
Old Traffic Sign Shop

Figure 2
Left Turn Lane

the men who have been chosen for this commission are among the top executives in the City, and serve without compensation. These men are of such caliber that they have provided great stature for the new department.

Another improvement of a general nature has been the construction of a new sign shop. Our present shop is one of the finest if not the finest municipal sign shop in the country. It is a completely new building with all the modern equipment necessary to streamline the manufacture of traffic signs on a production basis. (See Figure 1a and 1b.) In fact, while traffic sign manufacture and installation, street painting, and parking meter maintenance have increased nearly 400 per cent in the last ten years, our manpower has increased only three per cent. We are quite proud of this record which has been made possible through improved equipment, efficient use of manpower, and complete co-operation of everyone involved.

During the past ten years, traffic has increased in Detroit about 33 per cent, while street capacity, which also includes expressways, has increased only about eight per cent. Still, Detroit traffic moves smoothly, safely, and rapidly. This is possible only through the maximum application of all known traffic engineering techniques and the use of modern control devices. I would like to enumerate a few of the steps that have been taken during this ten-year period to cope with this one-sided traffic problem.

Over the long haul, no traffic engineering program can be completely successful without considerable planning. It is true that most day-to-day problems can be handled with the use of control devices. However, long range improvements such as new roadways, street widenings, street openings, and grade separations are very expensive. Because of financial limitations, it is usually many years before these improvements can be realized. Therefore, careful planning is necessary to assure proper design and priority of construction in order to produce the greatest traffic benefits and to realize the greatest value for every dollar spent.

For the past several years our Planning Division has been working on what we call our Long-range Street Improvement Plan. Every needed improvement that involves either construction or reconstruction has been sought out, studied, designed, evaluated, and assigned priority. We now have listed some two hundred projects that will cost approximately $250,000,000. These are on surface streets only, and do not include expressways. We have been aided in this work by the State engineers who recently completed a statewide traffic needs study. We have also been helped tremendously in our future planning by an origin-destination study completed about two years ago costing about $750,000 and covering the entire metropolitan area. The information from this study has been especially helpful in planning and scheduling the expressway system which will eventually include 120 miles of such roadways within the City. The Study is being continued on a permanent but reduced basis in order to keep current the original information.

Available money for major improvements has been quite limited during the last few years. In that respect I presume we are no different than most other governmental agencies. However, even in the face of the money shortage during the past ten years we have:

1. Built 14 miles of expressway
2. Channelized 95 locations
3. Widened 36 miles of street
4. Built one grade separation
5. Opened one street (street extension)
6. Resurfaced 700 miles of major streets

While it is evident that the Planning Division was busy since 1947, the Traffic Control Division was equally busy trying to get the utmost out of our available street system by the use of signs, signals, and markings. During this ten-year period there was a gradual transition from streetcars to busses, with the result that some 170 miles of streetcar tracks have been abandoned. This changeover permitted resurfacing of these streets, and a new traffic plan for most of them.

One of the major changes that has taken place and which has been made possible by streetcar abandonment has been the installation of left-turn lanes on 47 miles of street. This plan involves the setting aside of the center lane for the sole use of left turners and pedestrians. A typical illustration is shown in Figure 2.

In 1947 we had 34 miles of one-way streets which have been expanded since then to 99 miles.

As a result of a rash of railroad grade crossing accidents in the early '40s, a thorough study was made of each of the 268 grade crossings in the City, and plans laid for the prevention of these accidents. In the last ten years, half-roadway gates have been installed at 57 locations, flashers installed at 39 crossings, and miscellaneous improvements such as signs and improved roadways over the crossings at 43 locations for a total of 139 crossings. At the present time, railroad grade crossing accidents in the City of Detroit are practically unheard of.

Since 1947, we have added traffic signals at 539 intersections for a total, at this date, of 1,116 locations. We have also improved the visibility by the installation of overhead mastarm signals at 372 locations, and have modernized controllers at 336 locations with the result that we now have 72 miles of fully flexible, interconnected, fixed-time systems outside of the Central Business District. The Central Business District itself has 142 signalized intersections which are interconnected and provided with flexible controls.

In 1947 there were approximately 40,000 traffic signs on the streets. Today, we are using about 115,000. During this same period, a filing system was established which automatically discloses signs that are in need of replacement so that there is no reason for any sign to be on the street longer than was originally planned. Recently, all of our traffic sign data has been put on IBM cards. The information that is available from this system is of tremendous help in planning budgets and purchasing materials for sign work

(Continued on page 576)

Costs of Excessive Congestion in Philadelphia

by Howard S. Lapin
(Jun. Mem., ITE)
Research Associate
Institute for Urban Studies
University of Pennsylvania, Philadelphia

THE BENEFITS of free-flowing traffic facilities in cities are measured in terms of savings in costs of accidents, of vehicle operation, and in drivers' time. Converse to these positive values are losses resulting from wastage of time, effort and fuel in the excessive congestion found in many urban trafficways.

The economic benefits derived from improved highway transportation systems within cities are considered in the first part of the article. Losses suffered as a result of excessive traffic congestion on streets in Philadelphia and in other cities are discussed in the second part.

These congestion costs and freeway savings are closely related, in both dollar measures and in physical terms. For one thing, the diversion of vehicular traffic from congested streets to free-flowing urban expressways may cause the same, or the same type of, avoidance of needless waste.[1] On the other hand, there is a potential danger that the traffic-generating characteristics of free-flowing radial expressways may bring excessive traffic to the central business district and bring about even greater losses due to increased congestion. This latter point bears on physical system design—to the extent that access to the central part of the city must be developed in balance with street capacities and parking capacities in the central city. Further, this potential danger is background to the problem of apportioning the investment in urban highways and public transit facilities.[2]

1. In estimating values of savings or costs it is important that a "double accounting" be avoided. The total benefits of system improvements should not be overstated by adding the reduction in street-congestion costs to the savings realized in expressway travel.

2. See Chapter V, "Plan and Program 1955," City of Philadelphia, Urban Traffic and Transportation Board, for a fuller discussion of this problem in capital fund allocations.

Studies of Freeway System Benefits

Studies of economic benefits of improved vehicular facilities include savings in accident costs, operational costs, and in time costs. Although the first item is difficult to evaluate fully, in work-time lost and in human misery, the insurance payments at least can be evaluated. Estimation of vehicular operational savings are straight-forward calculations: these compare maintenance costs and fuel costs of driving on the old and on the improved facilities. The time-cost is controversial; whereas time savings of truckers and others traveling in the course of business can be evaluated, time savings to persons driving to and from work are less easily measured. One view is that these time savings have true and measurable economic value, if for no other reason than that (in a number of instances) private citizens have shown willingness to pay in toll charges for their savings in driving time and for the avoidance of annoyances caused by congestion.

Rates per 100 million vehicle-miles on urban freeways and on major surface streets have been studied for fatal injury and property damage accidents. Assigning total premiums paid for physical and property damage in automobile accidents and for public liability, to the equivalent total travel in vehicle-miles, Lloyd Aldrich, Los Angeles City Engineer, states that potential accidents cost 0.70 cents per vehicle-mile (in California, 1950).[3] On the other hand, he says that "travel on freeways is made at one-fifth the accident risk that prevails on typical surface routes." He concludes, therefore, that accidents on freeways in Los Angeles "cost" about 0.14 cents per vehicle-mile. The accident savings, then, are evaluated at 0.56 cents per vehicle-mile in the Los Angeles study. He further notes that all the costs of damage are not included in the estimate; hence this unit figure for savings is conservative. Necessarily omitted from the estimate (for lack of data) are figures for damage amounting to less than that covered by "deductible" policies.

3. "The Economy of Freeways," City of Los Angeles, Street and Parkway Division, June 1953. p. 12.

Mr. Aldrich found that fuel savings per vehicle-mile, in travel on freeways rather than on surface streets, range from 0.33 to 0.53 cents per vehicle-mile for the average passenger car. He assigned maintenance cost savings of 0.24 cents per mile for the comparison. This unit cost, which he thought might be considered even "absurdly low," represents a saving of 0.18 cents in clutch and brake repairs, and 0.66 cents for moving parts.

Thus, without consideration of time savings, operational savings on freeways have been found to range from 1.13 to 1.33 cents per vehicle-mile for an average passenger car.

Estimates were made for the savings in time found for commercial vehicle operation. To use these estimates in the unit figure of savings for all vehicles, this time value was reduced on the consideration of the number of commercial vehicles taken as a proportion of the total number of vehicles. The prorated estimate adds 0.87 cents to the unit savings for all vehicles, and brings the total to a range of 2.0 to 2.2 cents per vehicle-mile.

Certain other assigned costs might be restudied. For instance, settlements paid, rather than premium costs might be considered a truer measure in converting costs to savings. Unrealized income of the insurance people would then be omitted from the unit figures for savings in accidents. Still, the possible refinements in the figures would

not greatly alter the unit costs. By and large, the unit-cost figures for savings as found on the Los Angeles vehicular facilities have been accepted as valid for comparable economy studies.

Application of the unit-cost figures (for savings in expressway travel) to total traffic volumes must be undertaken with caution. The estimator can be led astray by the reasoning that the total savings will be greater with increasing numbers of vehicles using a particular facility. The question of "balance" in traffic loads carried in private and public vehicles must be considered. It would be false logic to apply the unit savings figures derived above to unlimited increases in volumes of automobile traffic. For economy studies the figures should be applied only to those intra-urban movements which cannot be adequately accommodated by public transit.

With these qualifications, it is of interest to note the savings anticipated on the Los Angeles system, where public transit does not serve the urban population to the extent found in other cities of comparable size. Unit savings (at a rate of 2.0 cents per vehicle mile) were applied to plans for additional freeway projects in Los Angeles, totaling 185 miles in length, and estimated to cost $775 million. The findings were that "benefits would equal the initial cost of the 185 miles in less than seven years if time and savings to private passenger cars were evaluated, or 15 years, if not."[4] The conclusion is based on these assumptions: interest at 3 per cent, compounded annually and applied to annual benefits reduced to a present value; passenger-car time savings at $1.35 per hour.

Costs of Urban Traffic Congestion

Evaluation in dollars of the total losses in cities due to excessive congestion requires so many assumptions based on little knowledge that no firm estimates are possible. It is believed that present annual costs of excessive congestion in Philadelphia, without assessing time losses to motorists driving in their "own" time (e.g., en route to work), range from 100 to 200 million dollars. This compares with a 1953 estimate made for New York City[5] of over one billion dollars per year. After elimination of some items from this latter figure which are not believed allowable as economic costs of excessive congestion, the New York estimate appears to be 840 million dollars per year.

(Courtesy Philadelphia Daily News)

Typical congestion on city streets in the downtown area.

In considering traffic congestion in cities as an economic factor it is necessary to draw a line between "congestion" and "excessive congestion." Some friction in movement, and thus effective congestion, is inevitable where population concentrations occur within limited geographic areas, that is, within cities. Requiring evaluation are those losses which might be avoided by an improved circulation system.

Typical items in the "guesstimation" of congestion costs are vehicle-operating costs such as fuel wastage and high maintenance costs, accident costs, time losses by commercial carriers, and that part of urban blight and reduced property values assignable to excessive traffic congestion. To illustrate the scale of the problem, the British Road Federation "recently estimated that if the speed of London's buses and coaches could be increased by one mile an hour, that saving alone would amount to two million pounds ($5.6 million) a year."[6] A 1948 study in a New England city of 250,000 population indicated that time losses for trucks in the downtown section averaged one and a half to two hours daily. The total loss was estimated at $15 million per year.[7]

The techniques of traffic engineering provide the most immediate and direct means to reduce excessive congestion, while over a longer span of years, city planning and highway engineering practices offer potential for reductions in excessive congestion and its costs. Knowledge is only recently becoming available for dealing with the difficult problems involved. For instance, it has been recently observed that the "average number of accidents per intersection carrying between 10,000 and 14,000 vehicles per day is ten times greater than the ratio for intersections handling between 4,000 and 5,000 vehicles per day."[8] As the critical traffic volume conditions for a given facility design are determined, the better design of future facilities is made possible.

The avoidable accidents and other needless waste caused by excessive traffic congestion can eventually be reduced with the present investment of funds in traffic engineering and city planning research, and in planning and design of new facilities. Whatever the actual costs of traffic congestion in Philadelphia are, whether 100 or 200 million dollars per year, they are obviously too high, and concerted effort should be made to reduce this form of wastage.

4. Lloyd Aldrich, "A Study of Freeway System Benefits." City of Los Angeles, Street and Parkway Division, Sept. 1954. p. 4. These points are discussed further and applied to specific examples in an article by Robert S. Henderson, "Freeway System of Benefits" ("Traffic Engineering," March 1956), and in a November 1955 report to the Joint Interim Committee on Transportation Problems of the California State Legislature.

5. "Cost of Traffic Congestion and Traffic Accidents in the City of New York," Citizens' Traffic Safety Board. 1953.

6. Highway Research Board, "Urban Traffic Congestion," Bulletin 86, Washington, D.C. 1954, p. 14.

7. This estimate appears to compare present congestion against no congestion: but not all the $15 million loss is avoidable if trucks are to continue to serve the downtown area. With careful planning and engineering and the necessary capital investment, the losses might be reduced to some fraction of the $15 million figure.

8. Highway Research Board, op. cit. p. 15, discussing the work of Morton S. Raff.

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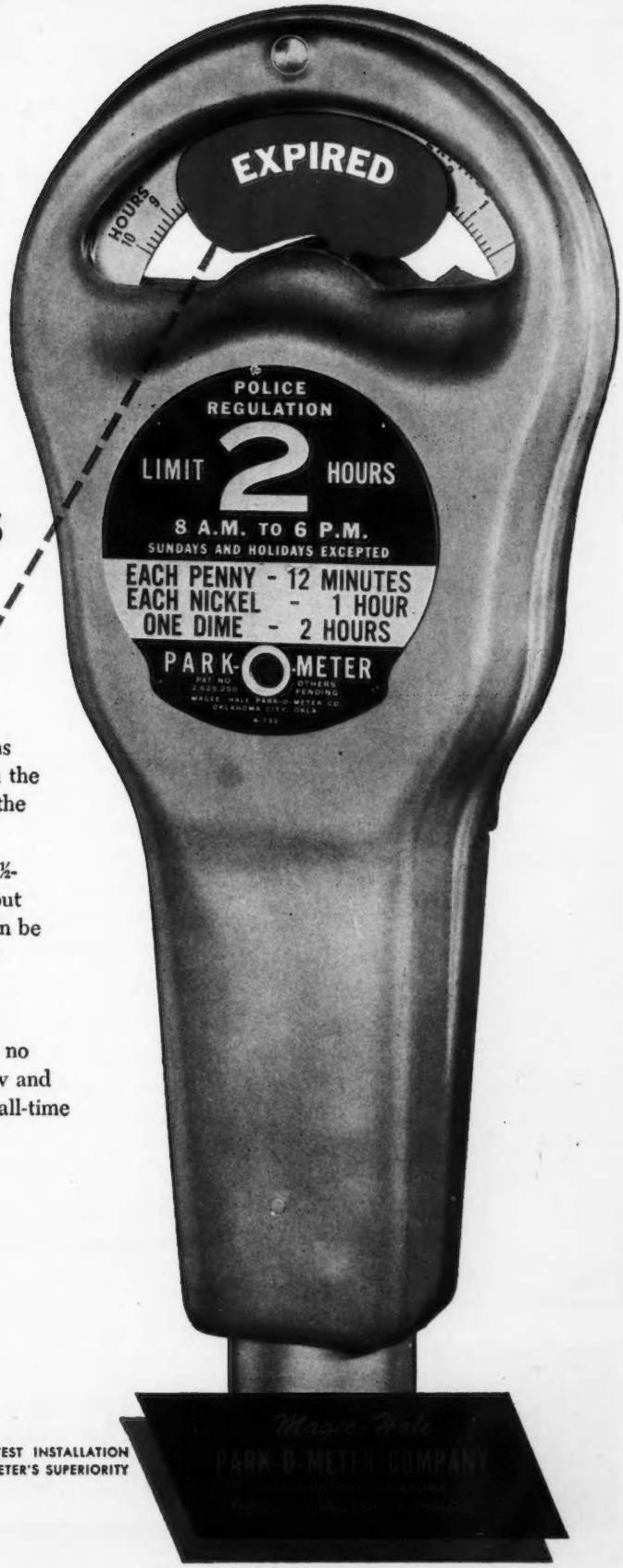

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The Board of Wayne County Road Commissioners . . .

Pioneers in Road Building and Traffic Engineering

by J. L. Wehmeyer
Engineer of Traffic & Safety
Wayne County, Michigan

THE BOARD OF WAYNE COUNTY Road Commissioners has been a forerunner in the highway field for many years. It is proud of many innovations, not the least of which is being one of the first county road organizations to establish a traffic and safety engineering division.

Wayne County, within whose boundaries lies the dynamic motor city of Detroit, might well be called the industrial heart of America. Encompassing some 623 square miles, there are within Wayne County 28 incorporated cities and villages, along with a number of townships highly developed in residential and industrial areas. According to the 1950 census, the population of Wayne County is 2,435,235.

Except for state trunklines and City of Detroit streets, the primary road system within all municipalities and all highways and local streets within townships throughout Wayne County are built and maintained by the Board of Wayne County Road Commissioners. This comprehensive network of roads includes over 90 miles of thoroughfares within the Detroit city limits. All state trunklines outside of Detroit and the expressways both in and out of Detroit are maintained by the Board.

Last year the Board of Wayne County Road Commissioners celebrated its golden anniversary. The county road system had been adopted by a large majority of the voters in the special election of September, 1906, and Commissioners Edward N. Hines, Henry Ford and Cassius R. Benton at their first meeting on October 1, 1906 began the task of developing an adequate county-wide highway system. They started with a nucleus of a comparatively few miles of mud, gravel, corduroy and plank roads which radiated "like the spokes of a wheel outward from Detroit as a hub."

Today, Commissioners William E. Kreger, Charles L. Wilson and Michael J. O'Brien direct operations on a system of nearly 800 miles of primary highways and over 1,100 miles of local roads. Annual expenditures on county roads exceed 15 million dollars. Some 900 people are employed by the Board on county highway operations.

In addition to highway activities, the Board manages other public works, such as the Detroit-Wayne Major Airport, Wayne County Parks and Parkways, and the Metropolitan Sewerage and Sewage Disposal and Water Supply Systems.

The first mile of concrete road was built by the Board of Wayne County Road Commissioners in 1909. The concrete was laid on Woodward Avenue from the northerly line of the Village of Highland Park to Seven Mile Road. Woodward Avenue is now a state trunkline and Highland Park is a city "within a city."

While a concrete highway was an innovation in the early 1900's and was to attract many visitors from the United States and all parts of the world then and for many years after, it proved so successful that thousands upon thousands of miles of concrete pavement now exist almost everywhere and concrete roads are accepted as commonplace today.

The half century just concluded by the Board of Wayne County Road Commissioners contains many other innovations which today are accepted as standards by highway authorities. In 1915 the finishing machine replaced hand labor in smoothing and leveling the surface of freshly poured concrete. The same year saw the use of scrapers towed by trucks to level snow on the highways, and snow plows were attached to trucks in 1918 to remove snow from the entire highway.

STREET LIGHTING INCREASES SAFETY AT NIGHT
This street lighting installation is an example of 81 new aluminum units installed along Outer Drive through Dearborn Township last year by the Board's Traffic and Safety Division. This winding section of Outer Drive which lies outside of any municipality was much in need of nighttime lighting. Generally, the provision of street lighting is a municipal responsibility throughout Wayne County.

Beautification of highways by tree planting was started in 1917 when the Garden Club of Michigan planted two miles of trees on Seven Mile Road and continued when legislation proposed by the Board to provide for highway tree planting was adopted in 1921.

The center line stripe to separate traffic lanes was an innovation of the

STANDARD TRAFFIC CONTROLS GUIDE DRIVERS

Dual overhead signal indications and pavement lane markings are standard controls providing for greater driving ease and safety on county roads, such as along the above section of Wyoming Road. The City of Dearborn and the Board of Wayne County Road Commissioners cooperated in the signal installation which is at Brandt Street to meet industrial traffic needs in the area.

Board of Wayne County Road Commissioners. For a few years, it was used only on curves and narrow bridges. During the early 20's, its use was extended to all paved county roads. Machines for this purpose were fabricated at the Board's shop in Wayne, Michigan.

The Board suggested appropriations for standard road signs for county roads in 1917 and commenced erecting such signs in 1918. The first road signs were erected in earlier years at the expense of the Detroit Automobile Club, now the Automobile Club of Michigan. Safety and railroad crossing signs were adopted by the Board in 1921.

The Board of Wayne County Road Commissioners fifty years ago adopted a plan to first improve main highways leading into Detroit from the county line, next to improve main roads leading to and from the smaller communities, and then to connect main highways to secondary roads. In 1917 plans for encircling Wayne County with outer, middle and inner belt roads were adopted, along with plans to replace inadequate, narrow bridges.

ROADSIDE PLANTING ADDS BEAUTY AND SAFETY

The parkway, trees and other plantings along this section of Outer Drive within Detroit exemplify the roadside development program of the Board's Parks and Forestry Division. Tree trimming along thoroughfares under jurisdiction of the Board of Wayne County Road Commissioners is largely devoted to a program which will best maintain and improve highway safety.

These early plans were completed by 1924 with some 360 miles of concrete roads constructed.

By 1920 the Board foresaw the need for highway planning to include Wayne and adjacent counties and suggested provisions be made for regional planning. In 1925 legislation was adopted to permit counties to join together to form superhighway commissions. Wayne, Oakland and Macomb Counties, together with the City of Detroit, adopted the so-called "Master Plan" which provided for 204-foot wide superhighways at three-mile intervals, 120-foot wide mile roads, and half-mile roads 86-feet wide. Michigan, Telegraph, Southfield, Fort, Grand River, Woodward, Mound, Kelly, Mack, Moross, Base Line, Vernier, Schoolcraft, Lake Shore Drive and James Couzens Highways are examples of superhighways through Wayne and adjacent counties which were constructed in accordance with the master plan.

In 1938 the Board recognized the need for and suggested the construction of an expressway system and constructed the first expressway in Michigan. Davison Expressway, which traverses the City of Highland Park for approximately one and one-quarter mile, was opened to traffic at the end of 1942.

More recent history included participating with the Michigan State Highway Department in the construction of the Detroit Industrial and Willow Run Expressways in 1941 and 1942; also, participating with the City of Detroit and the Michigan State Highway Department in constructing the John C. Lodge and Edsel B. Ford Expressways, starting with the tri-party agreement signed September 19, 1944. These expressways today are partially in use and scheduled for completion in 1957 and 1960, respectively.

For the immediate future the Board of Wayne County Road Commissioners is participating in planning the construction of four more expressways: Southfield Expressway from the Detroit Industrial Expressway to Base Line Road, Fort-Vernor Expressway from the Detroit-Toledo Expressway to Gratiot Avenue, Hastings-Oakland Expressway from Jefferson Avenue to the Edsel B. Ford Expressway, and extending the John C. Lodge Expressway to Southfield Superhighway.

Farther in the future are the planning and constructing of the additional

expressways needed to complete the network planned for the Metropolitan Area as were shown necessary in the recently completed highway traffic origin and destination survey.

The Road Commission's Traffic and Safety Division was established in 1928. The scope and extent of the work of this Division since its inception has increased in parallel with the growing needs for greater safety and efficiency in highway traffic operation.

The Traffic and Safety Division always has operated as an integral part of the Board of Wayne County Road Commissioners, and not as a separate appendage. The result has been an active and effective support of sound traffic policies and much valued assistance in traffic functions from all departments and divisions. County Highway Engineer Joseph W. Gross says, "It is a grave challenge which faces highway engineers today . . . to build roads which will free the motoring public of needless traffic jams, and more importantly, to find better ways of building roads on which we who drive find it more and more difficult to kill or injure ourselves."

At the present time, the Division's personnel totals nine persons, three of which are members of the Institute of Traffic Engineers. Two technical assistants, an administrative assistant, two survey men. and a secretary-stenographer round out the Division's staff.

Each year since the end of World War II, the Traffic and Safety Division has counted traffic at all major road intersections around the metropolitan area of Detroit; i.e., along Southfield Superhighway from West Jefferson Avenue, in the city of Ecorse, northerly to Base Line Superhighway, and thence east along Base Line and Vernier to Lake Shore Drive in Grosse Pointe. These counts are a measure of the traffic in and out of the Detroit area. In 1955, traffic across this cordon had increased 131 per cent since 1946 and, last year, increased an additional three per cent over 1955.

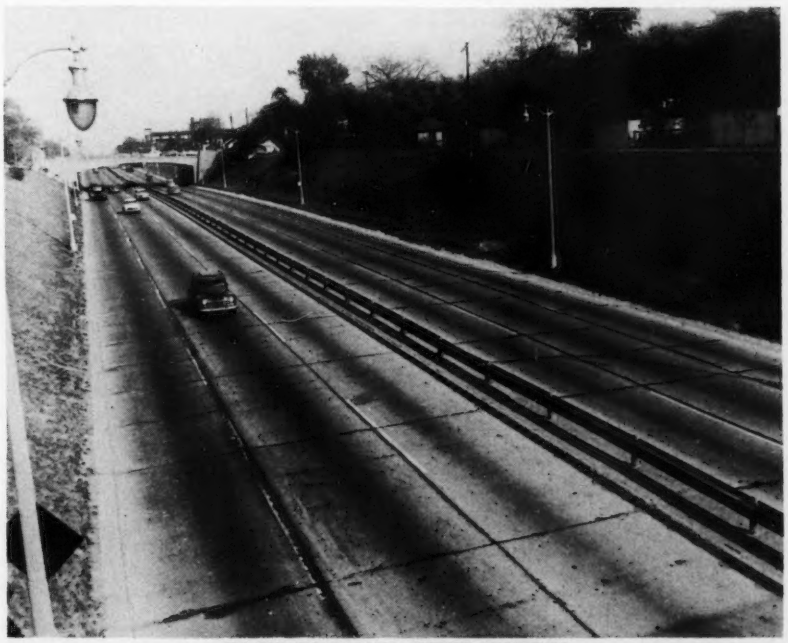
A traffic census west of the City of Detroit has been taken annually along Middle Belt Road, which runs north and south, and along Van Born Road, running east and west. These vehicle counts provide a good measure of out-county traffic since these roads pass through the centers of suburban areas which in recent years have seen a tremendous residential and commercial development. Along and crossing these two roads, traffic had increased 217 per cent, comparing 1955 with 1946, and again increased 5 per cent in 1956 over 1955; a clear indication that traffic volumes today are three times as great in the suburban areas of Wayne County as at the end of World War II.

GATES GUARD MOTORISTS AT RAILROAD CROSSINGS

Automatic gates and flashing signals protect motorists at this Michigan Central Railroad crossing at grade on Howe Road in the Village of Wayne. Gates are preferred at double-track grade crossings on the primary county roads, and the cooperation of the railroad companies has made possible numerous gate installations such as on Howe Road.

The Board's Traffic Signal Shop operates under supervision of the Traffic and Safety Division. The shop crew of 15 men presently is maintaining a system of some 650 traffic signals. In the last ten-year period (1947 through 1956) there are 422 locations where they have completed major signal improvements.

(Continued on page 584)



CENTER GUARD-RAIL AVERTS ACCIDENTS

The use of metal guard-rail as a traffic barrier is shown here on the Davison Expressway in Highland Park. The railing was installed in 1952 by the Board of Wayne County Road Commissioners, and out-of-control vehicles no longer jump the narrow medial island and into the severe consequences of head-on collisions. The Michigan State Highway Department has authorized installation of this type of guard-rail on the Edsel B. Ford and John C. Lodge Expressways.

The Michigan State Highway Department . . .

Pioneering Through Research

by Harold G. Bauerle
(Mem., ITE)
Director, Traffic Division,
Michigan State Highway Department

Figure 1
Typical overhead signing on expressway.

MICHIGAN has always taken pride in being open-minded in its efforts to acquire new and better techniques and equipment. Research is playing an increasingly important part in this effort.

Members and guests attending the 27th Annual Meeting of the Institute of Traffic Engineers in Detroit will be able to get a firsthand view of various traffic activities conducted by the Michigan State Highway Department and its associated agencies. Judging by the large volume of correspondence which we have conducted with other states, cities and even foreign countries, the signing on the John C. Lodge and Edsel Ford Expressways will be one of the first items on the sight-seeing list of convention-goers.

It was quite apparent in our early work on high speed signing that signs had to be larger and placed in positions of greater prominence to the eye of the driver. Since a driver must look straight ahead for the greatest portion of his driving time, the signs would be most easily seen if placed over the roadway. Another big advantage was soon realized from overhead signing inasmuch as the signs could be placed over the lanes for which their messages were intended. The motorist can orient himself on his proper driving path with greater rapidity as the result of such sign placement.

The decision to place the signs over the roadway was simple compared to the difficulties of making this a practical reality. In the first place, the signs would have to be of considerable size due to the speed of the roadway. This meant that the supporting structures would have to be of great strength. With both the signs and their supporting structure being over the roadway, erection and maintenance would be complicated.

In order to eliminate the necessity of periodically painting conventional structures over the roadway, we examined several different materials which were non-corrosive under field conditions. Most of them failed for either one reason or another and finally we narrowed our attention to the use of aluminum. While aluminum was able to be built into a structure which would need no priming or painting, there was considerable doubt about its welding properties and ability to carry heavy loads. New developments in aluminum materials and welding techniques along with fine technical assistance from manufacturers finally produced a structure which would possess the necessary strength of material while being economically feasible for practical usage.

One of the first aluminum structures used for overhead signing was a forty-four (44) foot span erected over US-127 on the northwest side of Mason. This structure was fabricated by Pfaff and Kendall of Newark, New Jersey. This same company later developed a one hundred (100) foot span of a trylon design which was erected over US-12 at its east junction with the Jackson Bypass. While these structures were well-designed for their intended requirements, we set out to create an aluminum truss which would carry three hundred (300) square feet of sign area on spans upward to one hundred (100) feet in length. A further requirement of the design was the ability to carry signs weighing eight pounds per square foot. This would permit the use of illuminated signs whose eventual use for certain areas is becoming more apparent. A box truss design was adopted because of its strength characteristics and the ability of workmen to work on the superstructure without support from below. All of the structures are erected with electrical conduit entrances in the bases and raceways are constructed in the span so that any electrical wiring will be concealed.

Figure 1 shows a typical structure. These overhead aluminum trusses can be found on the John C. Lodge and Edsel Ford Expressways and at isolated locations on the Willow Run Expressway. They were built by the Planet Corporation of Lansing, Michi-

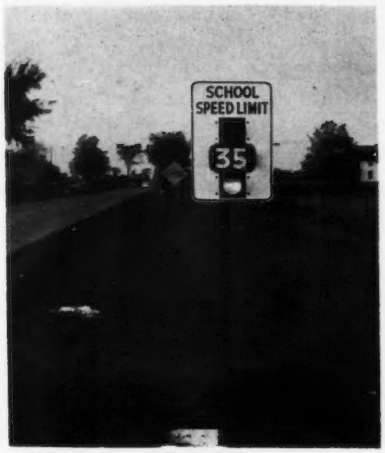


Figure 2
School sign with illuminated speed limit and flashing lights.

gan, which was the successful low bidder on the initial order.

Not only will the visitors be able to see the new aluminum trusses, but they will also see the new mast arm signs of a rigid type. They have two tubular arms which firmly support the sign. Steel is used in their construction. On the Willow Run Expressway, signs of a roadside type are utilized. Signs are supported on two fabricated steel beams which are set over anchor bolts embedded in concrete.

Not only is there a variety of sign supports, but also four different types of reflective materials. Materials manufactured by Minnesota Mining, A.G.A., Reflexite and Grote were used on different sections of the Expressway.

The problem of school protection has received considerable attention in Michigan. The reduction of vehicle speed during school crossing periods has been effectively met by the development of a new sign. This sign was evolved with the assistance of the Winko-Matic Signal Company.

The need of a school speed limit sign designed to be effective only during school crossing hours and having sufficient attention-gathering characteristics is very apparent if the motorist is expected to conform to its message. Such a sign should alert the motorist at a point sufficiently in advance of the school, and it should bear a speed legend which disappears when the sign is not needed.

For the purpose of bring the motorist's attention to the sign as he approaches from a distance, we utilized two standard flasher lens units which have a diameter of 6 3/8 inches and spaced 16 1/2 inches apart. The speed legend is located between the flasher lenses and all three are aligned in a vertical plane and are visored. The lens units are activated by alternate flasher operation which has proven attention-gathering characteristics. The three units are mounted from the rear on a 24″ x 36″ regulatory speed limit sign panel so that the lens units and speed legend unit protrude from the front surface of the sign panel. The sign as constructed for the Michigan State Highway Department is shown in Figure 2.

The speed message unit has an 11 3/4″ wide by 7″ high, one-quarter inch thick, hammered wire glass face. This face has a painted background so that the speed legend only is illuminated. The legend used in the trial installation is "35" in 6-inch numerals although this speed can be any value deemed applicable to the area considered. A 10 mm grid tube system mounted on four glass posts with a total length of six feet, five inches is used for illumination. A 6,000-volt 30-milliampere transformer is utilized for power supply. The transformer and all electrical wires, terminal block, etc., are mounted in the rear compartment. The unit is accessible from the rear by a back cover plate. The glass front is outlined by a sun shield to improve daylight visibility.

The entire unit is mounted at a five-foot bottom height above the pavement edge and is located in the normal line of signing which, according to Michigan standards, is ten feet from the pavement edge. The signs are placed approximately 1,000 feet in advance of the school. The regular "School" sign of the 36-inch warning series is placed beyond the speed limit sign approximately 200 feet in such a manner as to be readily visible to the motorist.

Radio control is now being evaluated as a means of turning the signs on and off. The cost of wiring the signs from a central point is considerable and radio control could be the means of providing a cheaper and more flexible method. An experimental installation will be in operation on US-127 south of Lansing at the North School before convention time.

Although traffic signals are the most commonly employed devices to get school children across the roadway, their lack of positive protection to the children and attendant hazards to motorists show their use to be deficient. Physical separation of the crosswalk from the roadway offers the most perfect solution to the problem. Underpasses are costly and possess well-known faults. Therefore means were sought to acquire a low cost overpass. It was possible to erect an overpass on M-43 west of Lansing at the Windemere School at a cost of $10,500.00. This structure spanned a roadway 44 feet wide and the piers were separated by a distance of 64 feet. There are now two companies in the Lansing area which can furnish and erect similar structures at or about the same figure.

Illuminated signs are being intensely studied in Michigan due to their effectiveness in gaining the motorists' attention. New specifications have just been completed for illuminated case signs which are used to designate lanes

Figure 3
Experimental illuminated speed and lane-use signs.

Figure 4
Neon right-turn arrow.

for "Thru," "Right," or "Left" turns and for regulatory signs such as "No Left Turn," "One Way Traffic," etc. Tubes used are of the fluorescent type and light the sign from the interior. These signs are used very extensively throughout the state. This particular series of signs has the advantage of having a black legend on a white background both day and night.

Larger signs of the expressway type are now being developed. It is hoped to have ready in a short time an illuminated sign which will be built in modular sections and have sign legends which can be assembled from stock. The advantage of such a sign will be tremendous for highway use since it will permit stockpiling of signs which can be readied for the field with any legend that may be needed. These signs will be of the interior illuminated type with white letters on a dark green background. They will be designed for mounting on the aluminum span trusses in such manner that they can be serviced from the span.

The Straits of Mackinac Bridge will be opened in November of 1957 and the Michigan State Highway Department has been entrusted with the responsibility of providing traffic control. This assignment has been given to the newly established Traffic Research Section. All the major direction signs on the bridge approaches will be illuminated and mounted on aluminum trusses. The variable weather conditions and prominence of the bridge makes illumination of the signs desirable.

There are two types of controls which will be employed. One will be variable legend speed signs. These signs will be of the interior illuminated type and designed so they will "blank out" unless illuminated. By this means, it will be possible to select the appropriate speed for each weather and surface condition. The second control will be a lane usage signal system. In conjunction with the establishment of this system, a research project is to be conducted on the appropriate symbols to be used on the lane control signals. There is no standardization on signals of this type now employed throughout the nation. This project will be conducted jointly between the Highway Department and the Traffic Safety Center of Michigan State University. Since evolution of symbols which will be readily understood by the motorist and not confusing with other signals is the prime purpose of the study, a psychologist will be employed for this project. From this, it is hoped to obtain a signal which denotes use of a lane and another signal which prohibits such use.

Both the lane signals and speed signals are designed for mounting over the roadway and Figure 3 shows these signs and signals as they appear at night. Although only one speed legend and one signal for each lane will ever appear at a time, the photograph shows more than one illuminated for comparison purposes. This experiment is being conducted on "Sign Alley" which is the nickname given to a road on the Michigan State University campus where the long sight distances offer an excellent location for the establishment of an experimental signal and sign testing area. An aluminum overhead truss complete with electric power to the span has been built at this location for experimental purposes.

Traffic signals have come in for their share of developmental work. Oversize traffic signals were tried at a very early date in Michigan and many new signal installations where there is high speed traffic will receive these signal heads. Experiments have been conducted with oversize green and red arrows (the flashing red arrow is used in signals where a stop is made before proceeding with the indicated maneuver). We have now adopted an oversize arrow indication on which specifications have been written. They are constructed of double stroke neon tubing. Figure 4 is of a field installation of this signal.

Another oversize green arrow of the interior illuminated, disappearing type legend is being placed in field operation at the present time. This has an advantage over the exposed neon tubing type since this arrow can be used on traffic signal operations where the signal phasing necessitates the disappearance of the arrow during certain intervals.

The State of Michigan now has legislation which makes it mandatory that all traffic signal installations have an overhead signal head facing each signalized direction. This means that a motorist will be given a real break since the signal will always be in his line of vision when he approaches the intersection. Although a pedestal signal may be seen more comfortably by a motorist waiting for a green signal indication, we feel that it is much more important that he see the signal well before he is required to stop. Pedestal mountings are reserved for pedestrian

signals unless certain unusual overhead signal visibility restrictions are encountered in which case "starter" signals are permitted. Spans are generally employed for mounting overhead signals due to their ability to locate a signal in any position over an intersection. We now have aluminum mast arms up to 30 feet in length and steel mast arms as long as 35 feet. This permits much better positioning of the signal head with this type of mount.

Pedestrian signals are being developed along a line which keeps them as distinctive from the vehicle signals as possible. The neon-type signals are quite distinctive in their appearance because of their construction and need little alteration, but the incandescent types created confusion due to their similarities. In addition, round eight-inch pedestrian signals with inscribed legends have always been considered inadequate due to poor visibility. Michigan's standards of signalization permit the locating of pedestrian signals on pedestals at the ends of crosswalks with little competition from the overhead vehicle signals. To further accentuate their difference for better observance, the incandescent style pedestrian signals are given a rectangular shape. The "Walk" signal is blue while the "Wait" signal is Portland Orange. The background fields of these signals are completely illuminated which gives visibility over a great distance under daylight conditions. The legend "Walk" is inscribed on the blue lens while "Wait" is placed on the orange lens. The legend, while not legible for any great distance, seems to be of secondary importance as indicated by preliminary studies on pedestrian obedience. If the blue and orange color combination for pedestrian signals could find national acceptance, it is possible that the legend could be eliminated completely, similar to the vehicle signals. The neon signals have likewise been equipped with blue and orange tubing and this color combination seems to be recognized by the pedestrian almost instinctively without instruction.

The standards employed by the State Highway Department in the painting of signals further accentuate the differences in the vehicle and pedestrian signals. Vehicle signals are painted yellow while pedestrian signals are painted dark green. Since yellow is difficult to camouflage, it makes a signal more readily visible under the various colored backgrounds found in the daytime. This is not important in the case of pedestrians since they approach at slow speeds and only have to view their signal from a short distance before entering their crosswalk.

Michigan has attempted to make it possible for a motorist to drive without a time piece by utilizing the disappearing legend sign on some of its regulatory signs. An example of this is the "No Left Turn" sign. This sign is finding increasing usage at locations where left turn prohibitions are needed at different periods of the day. This sign is usually at signalized locations and is suspended in the center of the signal span between signal heads. A time clock in the controller housing controls its operation.

One new device which preliminary studies show is markedly reducing accidents is an illuminated stop sign. A thirty-inch red stop sign with interior illumination is hung from a span underneath a standard red flasher signal. The benefits attributed to this device are the more positive nature of its message and the exact location of the intersection is more easily identified by the motorist traveling in the night.

A program of pavement edge marking has started in Michigan and will continue to expand. The public response to this safety device has been very enthusiastic. Roadside delineation is a part of several of our highways. As an added safety factor, delineators are yellow through the "No Passing Zones."

In addition to the developmental work in traffic control, all routine signing, pavement marking, and signalization is being carried on at an increased pace. All major trunkline routes have been completely re-signed and inventoried for the purpose of preserving the signing with good maintenance. Dual traffic signal heads are almost the rule rather than the exception due to a continuing modernization program which is kept in balance with the new installations. New techniques are followed in determining the need of school traffic studies taken for the purpose of determining school signals. This is a much more accurate means of indicating the need of a signal for obtaining safe crossing time intervals at school crossings.

The Traffic Research Section of the State Highway Department has been recently established for the purpose of performing developmental and basic research in traffic engineering methods and tools. This activity will entail a tremendous amount of liaison work with other agencies involved in this same type of work. Cooperative efforts are now being established with the Traffic Safety Center of Michigan State University and the Transportation School of the University of Michigan. This new section will permit a "clearing house" for traffic engineering research in Michigan with a consequent improvement in liaison between various agencies and the elimination of duplicating efforts.

One example of the projects to be undertaken is a study now being started on the fundamental characteristics of traffic flow. This is being conducted through the cooperative efforts of the Michigan State Highway Department and the Michigan State University Traffic Safety Center. This project involved the utilization of three radar vehicle volume counting detectors and two radar vehicle speed meters. Figure 5 shows the installation in the field.

(Continued on page 581)

Figure 5
Radar detectors for traffic research project.

Safety on the Highway . . .

A Problem of Vision, Visibility, and Color

by Faber Birren

New York

This article originally appeared in the American Journal of Opthalmology *for February 1957, and is reprinted here by permission.*

THE WHOLE OF AMERICA rides on wheels. Out of a population of 168,000,000 it operates about 56,000,000 motor vehicles, one for every third citizen.

The enormous toll of human life and limb constitutes the largest and most serious problems of safety in the country. In one year there are about 40,000 deaths and 1,350,000 injuries. The total cost to the nation is in excess of four billion dollars annually.

Except where there may be outright mechanical failure or so-called "acts of God," most automobile accidents may be attributed to faulty vision and perception and to reckless emotional and psychologic attitudes. In other words, the driver doesn't see clearly, his judgment of distance, speed, and orientation to hazard are faulty, or he just does not care!

The Gestalt of Seeing

As the psychologist W. Kohler has written,* "The sensory and the motor system are not two separate systems, merely connected by communication pathways. They are parts of one comprehensive system." The whole *gestalt* of safety on the highway involves many complex interrelationships: the ability to see; the speed and direction of voluntary and involuntary reaction to what is seen; good sensible judgment; emotional and psychologic attitude of the driver toward himself and the world beyond. Put them all together and the problem to be met begins to resolve itself.

There must be safe roads and safe automobiles, stringent traffic regulations, careful driver screening and training, adequate eye examination and testing, car inspection, education, and enlightenment on human responsibility.

Vision and Visibility

Since my training has been in the fields of vision, color, and safety, my concern with highway traffic and accidents centers around these factors. Because the simple art of seeing is perhaps a dominant factor in the protection of life and limb, there is good reason to study and restudy various practices followed today, such as in roadway markers and highway signs.

Since 1942, American industry has worked successfully with a co-coordinated safety color code which, in many instances, has lowered accident frequencies. This has been previously reviewed by me, together with various other notes on brightness, visibility, and the over-all requirements of safe and efficient seeing.†

Much that has been accomplished in industrial plants through capable research and trial may be transferred to the field of highway safety. While conditions on the open road may not be directly comparable with those encountered in a factory, none the less the same public is involved and sound principles developed elsewhere may be taken out on the highways.

Human Side of Color

It goes without saying that good vision is a chief factor in highway safety. Yet it is one thing to be able to see and another thing to be affected or stimulated by what is seen. Here is where color has dynamic use and where its benefits have been most effective in safety work. For color in vision adds a necessary force of compulsion to the visual process. It commands attention, arouses interest and pleasure, and seems to work its way deep into consciousness.

Although somewhat afield from safety, consider the human "impact" of color in the everyday experiences of shopping in a supermarket or reading magazine advertising. In the supermarket, for example, it is conceivable that all packages in black and white would be quite visible. Yet color is introduced for purposes of outright attraction. Researchers estimate that fully 60 per cent of purchases are on an impulse basis, and much credit goes to color for stimulating desire in many things not on the shopper's list.

In advertising, where the cost of color is expected to pay a profit, a great amount of research is constantly undertaken. Based on studies of black and white advertisements versus colored advertisements, fully 50 per cent greater readership and memory retention have been demonstrated. In other words, people—you and I—pay more attention to the colored pages and remember them better.

If in these simple, human experiences, color is found to prod attention, then it should produce similar results on such devices as highway signs.

Research in Visibility

A review of research on traffic signs reveals general agreement of a number of points. Yet the whole problem —from the highway safety standpoint —- by no means rests with legibility alone or extreme contrast.

Here is a subject very familiar to me. By and large, good legibility is a direct function of size and contrast.

*"Gestalt Psychology." New York, Liveright Publishing Corporation. 1947.

†The ophthalmic aspects of illumination, brightness, and color. Tr. Am. Acad. Ophth., May-June, 1948; An organic approach to illumination and color. Tr. Am. Acad. Ophth., Jan.-Feb., 1952.

Figure 1

The railroad semaphore. Over a generation ago careful research established red as the color of highest recognition, followed by green, then yellow, with white fourth. Here is the forerunner of the modern traffic signal. (Photograph courtesy of Association of American Railroads.)

In studies conducted many years ago by Ferree, Rand, and others, where there are conditions of extreme brightness (as during a sunny day), white on black holds certain advantages because it tends to control glare. A large white area may cause letters and images to appear blurred and may produce a temporary blindspot on the retina, particularly under full sunlight. In darkness or dim light, black on white is desirable because it sets up a bigger target and is easier to seize upon visually.

Such facts are more or less academic. Many tests of visibility and legibility, however, are conducted under controlled conditions in which (a) the observer's attention is fixed, and (b) he approaches the sign slowly. Such a situation is not very typical of average driving in which there are countless distractions, high speed, and a wandering eye and mind.

There is a further and mighty important factor derived from studies in industry. No average mortal is likely to take any sign seriously when what it has to say lies on the threshold of his vision (when the message is barely visible). He will wait until he gets reasonably close. Therefore, before the sign serves a practical purpose at all, it must itself be found and located!

Having this preliminary need in mind (to find the sign, even before it is or can be read), the value of color begins to loom large.

Need for Recognition

A generation or more ago the railroad industry conducted a number of tests which led to the use of such colors as red, green, yellow, white for signals. This research, incidentally, was adopted later in the red, yellow, and green traffic signal, the standards being the same as those of the Association of American Railroads.

The job of the railroad engineer, obviously, was not only to see lights or objects along the right of way, but to be able to recognize and identify them with minimum difficulty. This research led to the accepted fact that in recognition red was the color of first importance, then green, then yellow, with white fourth. In other words, while white might be a color of high visibility, it tended to lack impulsive attraction and psychologic interest.

Red and White "Tops" Sign

In the preparation of this report I have conducted two special studies which I am happy to review. (These first efforts will be supported later by further analyses to be undertaken through the kindness and voluntary cooperation of traffic engineers.)

Many behavior habits of human beings are rather automatic in nature and frequently they circumvent mental effort. Not many persons will know the number of steps in his house from the first to the second floor, even though he may climb them hundreds of times. On what side of his head does a man's best friend comb his hair? What a person may see time and again may not be mentally scrutinized in much detail. What is unimportant may be perceived and forgotten.

In a first study, a conventional stop sign in red and white was placed in a prominent location with the letters reranged to read TOPS. Under the assumption that a stop sign registers primarily for its color and shape, it could be expected that few persons would note anything unusual.

This is precisely what happened. After passing the sign, 100 drivers were questioned. Of these, 86 per cent admitted that the word TOPS had been overlooked. Habitual drivers along the road took less notice (87 per cent) than strangers (79 per cent).

To expect average mortals to think continually in the process of seeing will seem quite contrary to human nature. In industry bright colors will mark danger spots far more effectively than will signs containing words and

Figure 2

Some 86 per cent of drivers saw nothing unusual about this sign. Primary reaction was to color and shape, with the legend secondary.

legends. The reason is simple enough, for visual reaction to color is involuntary, while words require deliberation.

Restudy of Color and Legibility

In a second study, the general subject of legibility was reviewed. Here four reflectorized signs (white on red, black on yellow, black on white, white on green) were prepared, using eight inch letters on an octagonal panel. The test was designed to check relative legibility, and to interpret the data in terms of realistic driving speeds. After all, any test of legibility, to be valid, should consider the average facts of automobile driving and not be isolated from it.

In these four commonly used signs, all reflectorized, actual legibility (averaged among several observers) was as follows for both day and night.

DAYTIME LEGIBILITY

Sign	*Rank and Distance* (feet)
Black on white	1—404
White on red	2—361
Black on yellow	3—358*
White on green	4—358*

*These two sign had equal legibility.

Sign	*Rank and Distance* (feet)
Black on yellow	1—341
White on green	2—337
Black on white	3—316
White on red	4—312

The above data more or less confirms previous legibility tests. On an average the signs were legible on night driving at 88 per cent of the day viewing distance.

However, whereas black on white and white on red ranked first and second for daytime legibility, they ranked third and fourth for nighttime. The best night signs (reflectorized) were black on yellow and white on green.

All-Important Factor of Speed

As has previously been mentioned, no average automobile driver will (or can be expected to) clearly read any sign on the exact threshold of visibility. He will first look for the sign and then approach it until what it has to say is readily visible.

The element of time is therefore significant. The sign will be read, not at the precise instant it is seen, but during the interval that follows.

In the legibility test described above are a few significant figures which would apply if a driver were proceeding at a speed of 50 mph.

1. During the day, the threshold points of the black on white sign (which ranks first) and the white on green sign (which ranks fourth) would be 0.627 seconds apart—a mere heartbeat!

2. At night, the threshold points of the black on yellow sign (which ranks first) and the white on red sign (which ranks fourth) would be only 0.395 seconds apart!

In both instances the time element (at 50 mph.) is less than the 0.75 second "reaction time" so often mentioned in drivers' manuals as the normal moment of hesitation between an external visual stimulation and a physical reaction to it. After all, the driver will have about five seconds to read the sign from the time he first sees it until it is at right angle to his eye.

From the above facts it is perhaps fair to state that slight differences in the legibility of traffic signs are of no great consequence. If black on white has minor advantage, it would be impractical to keep adding more and more combinations of it anyhow, because clear identity and differentiation through color would be lost and a meaningful code sacrificed.

Review of Existing Standards

The four color schemes used in the above test are those recognized today and commonly found on traffic signs. All have good visibility. And all, to repeat, should be reflectorized or illuminated in order to assure general high brightness at night and a uniform day-night appearance.

The red and white STOP sign: The combination of white on red has lately replaced black on yellow in STOP signs. The use of red solely for this identification is perhaps sound, for red is a color of high recognition and impulse attraction (although it may lack distinction to a low percentage of color-blind men).

Black on yellow warning signs: Here again the choice could hardly be improved. Black on yellow in warning signs follows capable research undertaken many years ago. In both visibility studies and legibility studies, yellow has outstanding advantages. Because of its color it has more impulse attraction than achromatic white. In exceedingly brilliant daylight it is less likely to show glare. Yellow reflects in the high visibility region where areas, forms, and images are sharply focused. (Yellow eyeglasses, which are commonly worn by pilots, gunners, and sportsmen to lessen the glare of full sunlight and overcome chromatic aberration in the eye, actually make for clearer vision despite the amount of light absorbed by the yellow filter.)

Case Against Black

Black on white regulatory signs: This combination, though commonplace, is probably satisfactory. As the number of highway signs increase, however, too much use of the combination may offer certain drawbacks of repetition and monotony.

Guide signs: My agreement with the above standard practices, however, comes to an end when and where black is recommended as a background for guide signs — or for the background of any traffic signs, in fact. In the "Manual on Uniform Traffic Control Devices for Streets and Highways," white on black is said to yield "better legibility than the hitherto standard black on white." It is suggested as an alternate combination for certain guide signs (Section 94), destination signs (Section 113), distance signs (Section 115), and information signs (Section 117).

A thorough investigation of research on color, visibility, recognition, and safety would seriously question black as a suitable color for sign backgrounds—despite the high legibility it gives to white legends or characters.

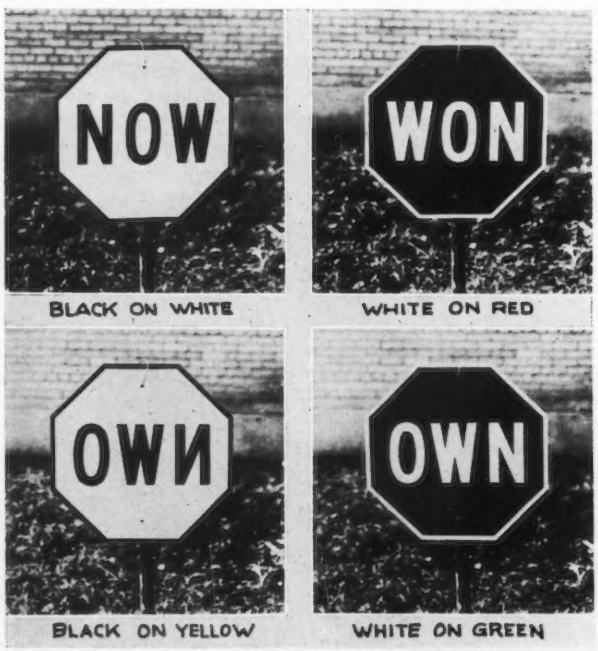


Figure 3
These four reflectorized signs were checked for relative legibility during the day and at night. Visual threshold points were only 0.627 second (day) and 0.395 second (night) apart at 50 mph.

Figure 4
White on green has been effectively used for destination markers to assure attention and recognition by the motorist well in advance of vehicle turning points.

First of all, black is almost wholly passive in the process of seeing. In effect, it affords virtually no stimulation of the nerves in the retina of the eye. Second, it is emotionally negative, holding little visual, mental, or psychologic interest. Third, being "emptiness" or "nothingness," it is most difficult to focus. Like space itself, black is hard to localize or to judge as to distance. It therefore sets up a poor target, even though the letters placed upon it may be easily seen.

White on Green Sign

In my opinion, the funereal combination of white on black could well be abolished for a newer and more vital standard—white on green. This would apply to directional signs, destination signs, distance signs, and route markers, all of which are tied together as far as the motorist is concerned, for they all relate to his wish to get to a specific place. If red is for stop, yellow for caution, white for regulation or information, green would be a likely symbol to keep him moving safely, confidently, and without distraction from one place to another, and along the route he needs to take. Obviously the green should be reflectorized so that its night symbol would be identical with its day likeness.

Upon inquiry, I find that the white on green reflectorized guide sign (for direction, destination, distance, route) has been adopted on many turnpikes and freeways in Maine, New Hampshire, Rhode Island, New Jersey, New York, West Virginia, Kentucky, Indiana, Ohio, Kansas, Oklahoma, Florida, and so forth. For the practice—and the standard—to become national would seem to be quite desirable. Green as a color is second in recognition only to red. And because it is emotionally tranquil rather than impulsive, it would find a wholly logical and secondary sequence to red for STOP and yellow for warning or caution. It would further mark the driver's journey effectively and consistently, offering a difference in color from white which thereby becomes more or less exclusively reserved for regulatory and information purposes.

New Era for Color

There is, indeed, more to color than greets the eye. Additional research is needed, involving not legibility or even visibility alone but the whole dynamic *gestalt* of seeing.

In the classical literature of vision and color are any number of references to the primitive quality of color (over form and shape). Maria Rickers-Ovsiankina* writes, "Color experience, when it occurs, is thus a much more immediate and direct sense datum than the experience of form. Form perception is usually accompanied by a detached objective attitude in the subject. Whereas the experience of color, being more immediate, is likely to contain personal, effectively toned notes."

After all, the useful "spectrum" for traffic purposes is extremely limited. The number of clearly distinguishable and different colors is few—red, green, yellow, white. Added to these might be orange, pink, blue, purple (none of which will be confused with the above), and the list is practically exhausted. In the future, the orange and pink might be introduced where high impulses are desired for some new and vital purpose. The blue and purple, however, (both of which are difficult to focus and tend to form a blurred image), might be held for other and less important uses.

Let it be remembered that color speaks all tongues. People love it, remember it, and are able to hold mental visions of it without difficulty. Its beauty and emotional appeal are all to its credit. And where it is functionally applied to traffic control and safety, it is assured of a wholehearted human response.

*Some theoretical considerations regarding the Rorschach method. Rorschach Research Exchange, April, 1943.

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Traffic News

Engineers Salaries Up In Latest Survey; Civils Lowest

Young engineers, chemical engineers, and engineers in education have achieved the largest gains in total earnings over the period 1952-56, and engineers employed by Federal agencies have made the smallest gains.

These are some of the findings drawn from the latest "Professional Engineers' Income and Salary Survey" published by the National Society of Professional Engineers.

The survey, third in a series started in 1952, is based on an analysis of 17,000 questionnaires returned from registered professional engineers in all the technical branches.

The survey shows an increase of 21 per cent in the median earnings of engineers during 1952-56, as indicated on the questionnaires returned. The median salary and income figure for the engineers responding in 1956 was $9,490, as compared with $7,850 in 1952.

The competition among employers for recently graduated engineers is reflected in the percentage increase in earnings for this group. Engineers at grade 3, a pre-professional level, were found to have had an increase in earnings of 28 per cent from 1952-56, a higher increase than was noted in any of the other grades.

Chemical engineers had a median earning total of $11,000 for 1956. Civil engineers had the lowest median earnings of any of the major branches with a figure of $8,750. Other median earning figures for 1956 were: electrical $9,460; mechanical $9,780; mining and metallurgical, $10,000.

The greatest increase in earnings, dollarwise, was reported by engineers connected with educational institutions, with those engaged primarily in teaching reporting the greatest percentagewise increase. Engineers in public utilities reported the second highest dollarwise increase, while engineers in industry reported the third highest.

For all groups except state government employees, greater increases were obtained between 1954 and 1956 than over the preceding two-year period.

Engineers employed by the Federal agencies showed an earnings increase on the survey of 12 per cent from 1952 to 1956. This increase trailed well behind percentage increases for the same period in industry, public utilities, education, state government, and county or municipal government.

A statistical breakdown on over-all earnings of engineers in 1956 shows that 90 per cent of those replying to the Survey questionnaire earned at least $6,390, as compared to a figure of $5,570 for 90 per cent in 1954. The 1956 survey also shows that 10 per cent of those replying earned at least $19,860. In between these two groups, the 1956 survey shows 75 per cent of the respondents earning at least $7,510; 50 per cent earning at least $9,490; and 25 per cent earning at least $12,840.

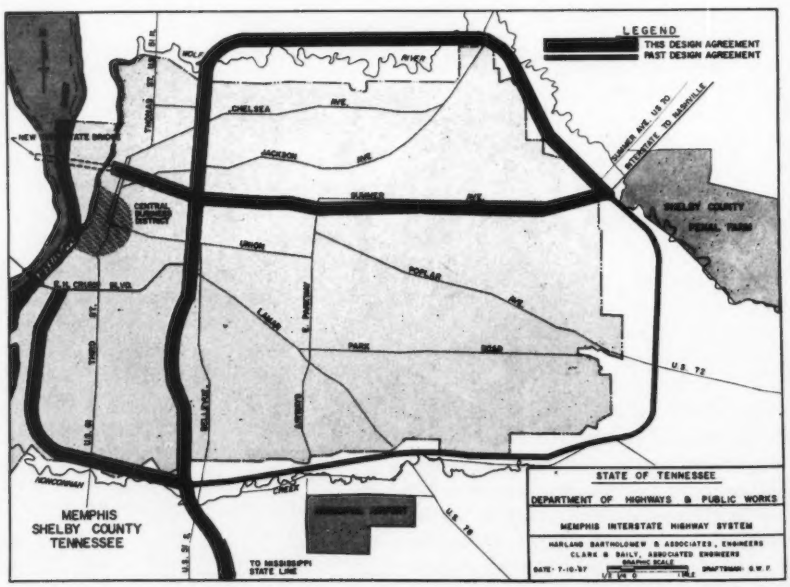
On a regional basis, the 1956 survey showed engineers in the East Coast states enjoying the highest median earnings. However, a comparison of the 1956 and 1952 surveys indicates a narrowing of the regional gap in median earnings. In 1952 the median income of East Coast respondents was $1,130 higher than in the South, and $1,400 higher than on the West Coast; in 1956, the East Coast was still highest, but the difference had come down to $880 and $1,160 respectively.

Memphis Interstate System Planning Well Advanced

The Memphis area Interstate Highway program has moved further into the design phase with agreement on approximately 37 miles of the proposed system in Memphis and Shelby County, with an estimated cost of approximately $140 million.

Included in the new agreement are north-south and east-west axis routes through the city, the north portion of the circumferential route. and the southwest section of the circumferential route extending south to the Mississippi state line. The southeast part of the circumferential route is already in the process of design under an earlier agreement.

Like many other American communities, Memphis has grown rapidly since World War II and highways have not kept pace with over-all expansion. Surveys indicate that traffic flow over Memphis area streets and highways will increase to 215 per cent of the present traffic level by 1975, as the area's population grows to 850,000 from the present 525,000. The new interstate system is designed to anticipate this increase and to grow with the expanding demand. Planned to be built initially with four and six lanes, the



system is designed to become a full six and eight lane facility in stages as traffic increases require.

The central problem in designing an interstate system for an already highly built up metropolis like Memphis is that the area in greatest need of traffic relief is the central business district, with its dense land coverage and high land values. The proposed solution was carefully evolved to provide the maximum service for vital areas, with minimum disruption to existing city development, and to avoid excessive right of way costs. The two internal routes, with the existing E. H. Crump boulevard, provide three sides of a much needed central business district loop.

Another aspect of the Memphis situation is the traffic concentrating factor of the Memphis-Arkansas Bridge, the only bridge across the Mississippi in Tennessee. Located about a mile south of the Memphis central business district, the bridge attracts a large volume of traffic to the same section which already acts as the chief origin and destination of traffic flow for the entire metropolitan area. A new $37 million bridge, proposed to be constructed about two and one-half miles north of the existing bridge in the vicinity of Winchester street, is expected to relieve the present load on the Memphis-Arkansas Bridge and to provide a better pattern of traffic flow on both sides of the river. The new expressways are being designed in anticipation of the new bridge.

Barnes Given New Title As Baltimore Adopts New Ordinance

Henry A. Barnes (Mem., ITE) has been named to a 6-year term as Commissioner of Transit and Traffic in Baltimore. The new appointment came just as Barnes was finishing his first 4-years in Baltimore after coming there from Denver.

This appointment was provided for in a new traffic engineering administration ordinance for Baltimore, which was passed in June and subsequently approved by the Mayor. Chief change was the creation of a new Department of Transit and Traffic, under the direction of a Commissioner. This raised the traffic engineering function to the city department level, where it occupies a position comparable to that of health, public works and others.

Changes for the new department are principally the creation of legal authority to proceed with improvements in the local mass transportation system wherever possible. Actually, the department has little authority over routes, loading factors or rates, as these are delegated by law to the Maryland Public Service Commission. The department does have responsibilities for making studies to ascertain whether present rates, loading factors and routes satisfactorily serve the people of the area and if they do not properly serve them to present evidence to the Public Service Commission with the request that necessary changes be made.

The new ordinance provides the department with broad authority to establish separate transit lanes or to set aside portions or entire streets solely for public transportation vehicles. One-way streets may be created, parking may be eliminated, turns prohibited, and any other actions taken which are necessary to speed up transit.

Also provided is the responsibility for preparation of a mass transportation plan for the future, including the entire metropolitan area.

The new department will include two divisions. One will be the old Department of Traffic Engineering and the other Transit. The traffic engineering program of the city is financed entirely by money from the gasoline taxes which cannot be legally used to promote mass transportation. The new Transit division will be financed from general city revenues. Initially, the new division will consist of a Deputy Commissioner, a secretary and two investigators.

Of interest is the fact that the ordinance provides an initial 6-year term for the Commissioner of Transit and Traffic. The Commissioner of Health is the only other city official in Baltimore who has ever been given a 6-year term of office.

NSPE Elects New President

Garvin H. Dyer, director of the Missouri Water Company and manager and chief engineer of the Independence Division of the firm, has been elected president of the National Society of Professional Engineers.

Mr. Dyer is a past president of the Missouri Society of Professional Engineers, and has served on the board of directors of that organization. He succeeds Robert J. Reinhart of Pine Bluff, Arkansas, as president of the National Society.

Mr. Dyer is an honor member of Chi Epsilon, past president of the Mid-Missouri Section of the American Society of Civil Engineers, and a former chairman of both the Missouri Section of the American Water Works Association, and the Missouri Water and Sewerage Conference. He received the latter organization's Award of Merit in 1954.

MOTOR VEHICLE DEATHS AND DEATH RATES

1955, 1956, and 1957

Month	1955	1956	1957	1955-57 Change	1956-57 Change
January	2,810	2,990	2,900	+ 3%	—3%
February	2,319	2,720	2,530	+ 9%	—7%
March	2,602	2,920	2,860	+10%	—2%
April	2,753	2,930	2,930	+ 6%	0%
May	3,101	3,170	3,110	0%	—2%
June	2,982	3,290	3,290	+10%	0%
Six Months	16,567	18,020	17,620	+ 6%	—2%
July	3,350	3,570			
August	3,586	3,610			
September	3,446	3,710			
October	3,918	3,460			
November	3,559	3,690			
December	4,000	3,940			
Total	38,426	40,000			

All 1955 figures are from the National Office of Vital Statistics.
All others are National Safety Council estimates.

Federal-Aid Road Construction Bid Prices Climb

Bid prices for Federal-aid highway construction in the second quarter of 1957 were 0.1 per cent higher than the preceding quarter, according to Federal Highway Administrator Tallamy. The figures were based on Federal-aid highway construction contracts awarded by State highway departments and reported to the Bureau of Public Roads. With 1946 as a base year, the price index rose from the low point of 125.15 in the second quarter of 1955 to 142.7 in the second quarter of 1957, a total increase of 13.7 per cent.

During the past 12 months the price index has been as follows:

Third quarter, 1956.....140.5
Fourth quarter, 1956.....140.7
First quarter, 1957.....142.6
Second quarter, 1957.....142.7

More Than 77 Million Held Driving Permits In U. S. Last Year

There were 77,869,284 licensed motor vehicle drivers in the United States during 1956, state agencies reported to the Bureau of Public Roads, and motor vehicle registrations reached 64,437,419. Since 1949, the first year in which such data was compiled, the number of licensed drivers has risen 18.5 million and vehicle registrations 20.3 million.

New Publications

Index of Traffic Safety Information—1956.

Volume 2. National Safety Council, 425 N. Michigan Avenue, Chicago 11, Ill. 1957. 63 pp.

The Index, prepared by staff of the National Safety Council Library, is a valuable listing of 1956 books, pamphlets and articles on traffic safety, arranged by subject interest.

The Highway Transportation Story

Third Edition. National Highway Users Conference, National Press Building, Washington 4, D.C. 1957. 32 pp.

Facts about highway transportation and its relation to almost every aspect of our economic and social life are presented in interesting and usable form. The booklet will be very helpful to anyone writing or speaking on a highway subject.

Films.

Michigan State University, Highway Traffic Safety Center, East Lansing, Michigan. July 1957. 27 pp.

This booklet is a catalog of highway and traffic safety films available through the Audio-Visual Center at Michigan State University. Particularly valuable is a table which classifies all the available films (some 125 in all) by subject emphasis area and by maturity level usage. One of the subject areas listed is "traffic engineering" and 14 films are checked in this area.

Road Research 1956.

Department of Scientific and Industrial Research, London. 1957. 88 pp. $1.04 postpaid from British Information Services, 45 Rockefeller Plaza, New York 20, N. Y.

This publication is the 1956 report of the Road Research Board in England, together with a detailed report of the Director of Road Research, Mr. W. H. Glanville. The latter section, which occupies most of the volume, contains substantial sections on safety and on traffic. Various research work is described briefly and results indicated, at least in general.

Of interest are the following paragraphs from the report of the Board:

Traffic engineers. We have stressed the importance of giving road engineers in this country further training in traffic engineering. Short courses have been given at the Laboratory since 1952, but these are mainly concerned with outlining general trends and with the research in progress.

We are glad to record that our Committee on Road Layout is studying this whole subject of traffic engineering. In view of this broadening of their terms of reference, we have felt it appropriate to change their name to the Committee on Traffic Engineering. We are very pleased to note the arrangements being made at the Universities of Birmingham, Durham and London to provide instruction in traffic engineering, and we hope that full advantage will be taken of them.

Coming Events

September 16-19—INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION—
Annual Convention, Fontainbleau Hotel, Miami Beach, Fla. Contact: IMSA, 130 West 42nd St., New York 36, N. Y.

September 23 - 26 — INSTITUTE OF TRAFFIC ENGINEERS—
Annual Meeting, Statler Hotel, Detroit, Mich. Contact: ITE, 2029 K St. N.W., Washington 6, D. C.

September 24-27 — AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS —
Annual Conference, Hotel Roanoke, Roanoke, Virginia. Contact: AAMVA, 912 Barr Building, Washington 6, D.C.

October 1-3 — SOUTHEASTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS —
Atlanta, Georgia. Contact: State Highway Department, Atlanta, Georgia.

October 10-11 — NATIONAL NOISE ABATEMENT SYMPOSIUM —
8th Annual, Sherman Hotel, Chicago, Ill. Contact: Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

October 13-17 — AMERICAN INSTITUTE OF PLANNERS —
Annual Meeting, Congress Hotel, Chicago, Illinois. Contact: AIP, 34 Brattle St., Cambridge 38, Mass.

October 14-18—AMERICAN SOCIETY OF CIVIL ENGINEERS—
National Convention, Statler Hotel, New York City. Contact: ASCE, 29 W. 39 St., N. Y. C.

October 17-19 — NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS —
Fall Meeting, Grand Pacific Hotel, Bismarck, N.D. Contact: NSPE, 2029 K St. N.W., Washington 6, D.C.

October 21-25—NATIONAL SAFETY COUNCIL—
Annual Safety Congress & Exposition Congress, Conrad Hilton and other Hotels, Chicago, Ill. Contact: NSC, 425 N. Michigan Ave., Chicago 11, Illinois.

November 18-22 — AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS—
Annual Meeting, Conrad Hilton Hotel, Chicago, Ill. Contact: AASHO, National Press Bldg., Washington 4, D.C.

1958

January 6-10—HIGHWAY RESEARCH BOARD—
Annual Meeting, Sheraton Park Hotel, Washington, D.C. Contact: HRB, 2101 Constitution Ave., Washington 25, D.C.

March 17-19 — WESTERN SAFETY CONGRESS & EXHIBITS —
5th Annual Meeting, Ambassador Hotel, Los Angeles, Calif. Contact: Joseph M. Kaplan, 3388 W. 8th Street, Los Angeles 5, Calif.

September 16-20 — FOURTH INTERNATIONAL STUDY WEEK IN TRAFFIC ENGINEERING—
Copenhagen, Denmark. Contact: World Touring and Automobile Organisation, 32 Chesham Place, London, SW1, England.

September 22-25 — INSTITUTE OF TRAFFIC ENGINEERS—
Annual Meeting, Columbus and McAllister Hotels, Miami, Fla. Contact: ITE, 2029 K St. NW, Washington 6, D.C.

New Appointments

Berry Joins Staff of Northwestern University

Donald S. Berry (Mem., ITE), formerly professor of transportation engineering at Purdue University, has been

Donald S. Berry

appointed professor of civil engineering in the Technological Institute, and to the staff of the Transportation Center at Northwestern University, effective August 1, 1957.

Professor Berry will plan and coordinate academic programs in transportation engineering, and will teach graduate courses in traffic engineering, highway economics, urban transportation, and related aspects of transportation engineering. He will participate also in the Transportation Center program of research.

Dr. Berry was professor of transportation for 1½ years at Purdue. In addition to teaching graduate work in traffic engineering and urban transportation planning, he was in charge of the transportation engineering program in the school of civil engineering.

From 1948 through 1955, Dr. Berry was professor of transportation engineering at the University of California at Berkeley. He also served there as assistant director of the Institute of Transportation and Traffic Engineering, and chairman of the Division of Transportation Engineering.

Prior to 1948, he served 12 years with the National Safety Council as director of the Traffic and Transportation Division. Prior to 1936, he had worked with highway departments in Michigan and South Dakota.

He received a Ph.D. degree in Civil Engineering—Transportation from the University of Michigan in 1936, and an M.S. in highway engineering from Iowa State College in 1933. He is a member of the American Society of Civil Engineers, American Society of Electrical Engineers, the Highway Research Board, and Sigma Xi, Sigma Tau, Phi Kappa Phi, and Tau Beta Pi. He has been a member of the Institute of Traffic Engineers since 1937, and has served as vice president, Midwest Section, and president, Western Section. He is currently head of the Department of Professional Standards and Education, ITE, and a member of its Technical Council; chairman of the Department of Traffic and Operations, Highway Research Board; a member of the National Committee on Uniform Traffic Laws and Ordinances and the National Joint Committee on Uniform Traffic Control Devices; and chairman of the Committee on Speed, National Safety Council.

Larkin Leaves Michigan For Cataphote Corp.

W. J. Larkin, formerly with the Michigan Highway Department, has been appointed by the Cataphote Corporation of Jackson, Mississippi, as technical consultant in connection with traffic engineering problems and applications. Duties will include advisory service to cities, counties, states, etc.,

W. J. Larkin

in planning and use of traffic signs, striping, and other non-electric traffic control products.

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Mr. Larkin is well known in the field of traffic engineering and control, having spent over 20 years with the Michigan State Highway Department, less some 3½ war years spent with the U. S. Army Ordnance Department.

Prior to joining Cataphote Corporation "Bill" Larkin was the Michigan State Highway Department Traffic Superintendent in charge of all sign shops, construction and maintenance of signs and markings.

In addition, he has served on numerous important committees, including those for traffic sign research, traffic paint research, sign production, and license plate reflectorization, and has a wide acquaintance among traffic engineers, nationally.

Margolin Named to Commerce Dept. Post

Edward Margolin, who has been in career government service in a variety of transportation positions for 15 years, has been appointed Assistant to Under Secretary of Commerce for Transportation Louis S. Rothschild, the Department of Commerce announced. In his new position, Mr. Margolin will assist the Under Secretary and Deputy Under Secretary for Transportation in establishing and maintaining program consistency among the following bureaus of the Department: the Bureau of Public Roads, the Civil Aeronautics Administration, the Defense Air Transportation Administration, the Maritime Administration, and the Weather Bureau. He also will assist in the review and formulation of transportation policies.

TEN YEARS OF
TRAFFIC ENGINEERING

(Continued from page 556)

months in advance of the actual installations.

In 1948, the maintenance of street name signs was assigned to this department. There are about 130,000 panels in use. The signs that we inherited were wooden with raised letters. Shortly afterwards, we changed to a painted steel blank with silk-screen letters, and two years ago we started a new change over to an aluminum blank covered with reflectorized sheeting material and silk screened legend. This new program is being done on a six-year basis as compared to a four-year replacement schedule on the old steel signs. In the long run the new signs while being much more effective (see Figure 3a and 3b) will actually cost the City less per year on a six-year basis than the old steel signs on a four-year basis.

Figure 3a
Night View of Reflectorized Street Name Signs

Figure 3b
Day View of Same Signs

Our street painting program has increased in gallonage approximately four times. In 1947 we were painting 936 intersections which have now increased to 1,128 locations. The mileage of lane lines has increased from 20 to 175, while centerline work has increased from 15 miles to 63 miles.

One of the best tools of the traffic engineer in increasing street capacity is the elimination of parking. This may be either on full twenty-four hour basis or rush hours only. In 1947 we had 187 miles of streets so controlled as compared to 337 miles of streets at the present time.

During the past ten years, parking meters have been installed to control some 9,000 street parking spaces.

Due to heavy snowfalls during the winter of 1951-1952, difficulty was encountered in removing this snow because of vehicles left parked at the curbs. In order to eliminate these parkers, not only for the removal of snow but for street cleaning during other seasons, parking has been eliminated on 360 miles of major streets between the hours of 2:30 a.m. and 6:00 a.m.

A unique feature which we have put into practice during the past ten years is what we call our Truck Consulting Bureau. The function of this bureau is to provide all truckers and trucking associations with the latest possible information on traffic control in order to expedite their movements over the city streets. Originally, we supplied these people with time-zone maps showing all of the parking restrictions and prohibitions. Since then, we have issued periodic bulletins to inform these people of the latest changes in parking controls and turning controls. From reports received this information has been of considerable help to the truckers.

In 1950 we began approving permits for all activities that had any effect on the movement of traffic such as the opening of streets, sidewalk canopies, advertising signs, curb cuts, wash racks, house moving, etc. Since then, we have handled 19,200 such permits and in so doing we have been able to stipulate the restrictions under which these various activities must take place.

I hope the foregoing statements of facts do not give the impression of bragging. This is certainly not intended. Far to seldom do traffic engineers have the time or take the time to reflect on their accomplishments over a considerable length of time. Such reflections can often provide a great deal of satisfaction and encouragement for the future. We recommend it highly.

To all of you who will be attending the Annual Meeting this fall, we cordially extend an invitation to look at any or all of the improvements that have been mentioned. We are looking forward to seeing you and will be more than happy to do our utmost to make your desired inspections possible.

City of Denver installs new P&K aluminum signal supports to help move increased traffic

Expanding industrialization and increased population has necessitated a new traffic signal program to keep traffic moving through the city. When completed, Denver will have a control system capable of safely handling today's traffic . . . *as well as tomorrow's.* Denver is planning ahead!

Modern lighting and vertical "over-the-road" signals are supported by new P & K aluminum shaft extensions and truss mast arms.

The use of these new P & K designs results in high signal visibility even against neon-lighted backgrounds and in congested areas. Great strength, easy installation and no painting or maintenance problems make these P & K units low in *real* cost.

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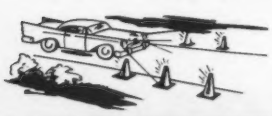

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YEARBOOK CHANGES

ARMSTRONG, Willard H. (Associate)
Special Studies Engineer, Ohio Planning Survey, 450 East Town Street, Columbus 15, Ohio.

BABCOCK, Willard F. (Member)
Director of Highways, State Highway Commission, Raleigh, North Carolina.

BARNES, Henry A. (Member)
Commissioner of Transit & Traffic, 401 East Pratt Street, Baltimore 2, Maryland.

BERRY, Donald S. (Member)
Professor of Civil Engineering, Civil Engineering Department, Northwestern University, Evanston, Illinois.

BOARDMAN, William F. (Associate)
Supervisor, Urban Highway Design, D. C. Highway Department. SEND MAIL: 5704 Ogden Road, Washington 16, D. C.

BOESEL, John L. (Junior)
Senior Civil Engineering Assistant, Los Angeles County Road Department. SEND MAIL: 6742 Montclair Street, Riverside, California.

BURCH, Robert A. (Member)
Traffic Engineer, State Highway Commission, Raleigh, North Carolina.

BURTON, H. R. (Associate)
City Traffic Engineer, 129 Adelaide Street West, Room 401, Toronto 1, Ontario, Canada.

CAMPBELL, Robert B. (Associate)
Assistant Traffic Engineer, Ontario Department of Highways, Room 1422, Parliament Buildings, Toronto, Ontario, Canada.

CHAMBLISS, Jack W. (Member)
Traffic Engineer, National Safety Engineers, Inc., P. O. Box 1609, Birmingham, Alabama.

FRINK, Leslie M. (Junior)
Traffic Engineer, Department of Public Works, 636 Garden Street, Santa Barbara, California.

GILBOA, Israel (Associate)
Traffic Engineer, DeLeuw Cather & Company, San Francisco. SEND MAIL: 804 Hawthorne Way, Millbrae, California.

GORDON, Nathan (Associate)
Highway Engineer, Bureau of Public Roads, Room 4012, GSA Building, Washington 25, D. C.

GUTHRIE, James R. (Associate)
404 Berkeley Road, Columbus 5, Ohio.

KINGMAN, William O. (Junior)
District Traffic Engineer, Washington Department of Highways, 4200 Main Street, Vancouver, Washington.

KUNDE, George H. (Associate)
Traffic Engineer, 3343 Pan American Drive, Miami 33, Florida.

LABIOSA, Victor M. (Associate)
Assistant Chief, Highway Planning & Research Division, Bureau of Traffic, Department of Public Works, Santurce. SEND MAIL: 370 Soldado Libran Street, San Augustin Development, Rio Piedras, Puerto Rico.

LAPIN, Howard S. (Junior)
Transportation Planner, Urban Traffic & Transportation Board, National Bank Building, 1512 Market Street, Philadelphia 7, Pennsylvania.

MACKALL, Kenneth (Member)
Cicero, New York.

MATTHEWS, Walter W. (Member)
Haverford Mansions, Haverford, Pennsylvania.

STRICKLAND, Richard I. (Member)
Assistant Chief, Traffic Engineering Division, The Port of New York Authority, 111 Eighth Avenue, New York 11, New York.

STRONG, Charles P. (Junior)
Assistant Highway Engineer, California Division of Highways. SEND MAIL: 6427 Julie Street, San Diego 15, California.

THOMAS, Richard C. (Junior)
Senior Assistant Traffic Engineer, Division of Traffic Engineering & Parking, Cleveland. SEND MAIL: 170 West Bagley Road, No. 15, Berea, Ohio.

VEY, Arnold H. (Member)
Principal Traffic Engineer, Simpson & Curtin, 1405 Locust Street, Philadelphia 2, Pennsylvania.

WHEDON, Burt (Member)
Traffic Engineer, Department of Public Works, City Hall, Omaha 2, Nebraska.

WHITESIDE, Robert E. (Junior)
Traffic Engineer, Wilbur Smith & Associates. SEND MAIL: 4529 Moss Hill Road, Columbia, South Carolina.

YOST, Light B. (Member)
Director, Highway & Traffic Safety Section, Distribution Staff, General Motors Corporation, 3044 West Grand Boulevard, Detroit 2, Michigan.

MEMBERSHIP APPLICATIONS

APPLICATIONS FOR TRANSFER

BOX, Paul Cranston
Street Lighting Engineer, Traffic Engineering Department, City Hall, Kansas City, Missouri. July 31, 1957 for ASSOCIATE grade.

COHEN, Jay
Traffic Engineer, Office of Chief of Transportation, Department of the Army, Washington 25, D. C. July 30, 1957 for ASSOCIATE grade.

CONRADT, Robert
Traffic Engineer, State Highway Department, P. O. Box 1614, Santa Fe, New Mexico. July 18, 1957 for ASSOCIATE grade.

COTTAM, Roy W.
Director of Traffic Signals, New York Department of Traffic, 100 Gold Street, New York 38, New York. August 5, 1957 for ASSOCIATE grade.

EDWARDS, Herbert M.
Associate Professor of Civil Engineering, Queen's University, Kingston, Ontario, Canada. July 12, 1957 for ASSOCIATE grade.

GEORGE, Lawrence E.
Signal & Illumination Engineer, State Highway Department, Salem, Oregon. August 5, 1957 for ASSOCIATE grade.

HUNNICUTT, J. Madison, Jr.
General Manager, Nashville Parking Board, 303 City Office Building, Nashville, Tennessee. July 31, 1957 for MEMBER grade.

KING, Gerhart F.
Civil Engineer III, Illinois Division of Highways, District 10, Bureau of Traffic, 160 North LaSalle Street, Chicago 1, Illinois. August 6, 1957 for ASSOCIATE grade.

MARVEL, Dale D.
Senior Traffic Engineer, Texas Highway Department, P. O. Box 1286, Houston 1, Texas. July 16, 1957 for MEMBER grade.

QUINBY, Henry D., 3rd
Principal Transportation Engineer, Parsons, Brickerhoff, Hall & MacDonald, 51 Broadway, New York 6, New York. July 12, 1957 for ASSOCIATE grade.

RAYMOND, William L., Jr.
Highway Engineer, Gannett, Fleming, Corddry & Carpenter, Inc., 600 North Second Street, Harrisburg, Pennsylvania. July 10, 1957 for ASSOCIATE grade.

ROBBINS, Donald O.
Assistant Traffic Engineer, Room 259, Civic Center, San Diego, California. July 30, 1957 for ASSOCIATE grade.

SCHROEDER, Walter R.
Traffic Engineer & Transportation Planning Engineer, City Hall, Stockton, California. July 19, 1957 for ASSOCIATE grade.

SHOCKEY, Jack W.
District Manager, A'G'A Division of Elastic Stop Nut Corporation of America, 1027 Newark Avenue, Elizabeth, New Jersey. July 16, 1957 for ASSOCIATE grade.

SLIDER, Earl R., Jr.
Assistant Traffic Engineer, City Traffic Engineering Department, City Hall, 68 Mitchell Street, S. W., Atlanta 3, Georgia. July 10, 1957 for ASSOCIATE grade.

STEWART, William A.
Chief Engineer, Municipal Department, A. D. Margison & Associates Ltd., 30 Eglinton Avenue East, Toronto, Ontario, Canada. July 10, 1957 for ASSOCIATE grade.

NEW APPLICATIONS

BERMAN, Jack
Assistant to Staff Director, National Committee on Urban Transportation, Room 323, 1346 Connecticut Avenue, N. W., Washington 6, D. C. July 17, 1957 for JUNIOR grade.

CANTILLI, Edmund J.
Traffic Engineer I, The Port of New York Authority, 111 Eighth Avenue, New York 11, New York. June 3, 1957 for JUNIOR grade.

ETHINGTON, Grover C., Jr.
Traffic Engineer, Kentucky Department of Highways, Division of Traffic, Frankfort, Kentucky. August 2, 1957 for ASSOCIATE grade.

EVANS, Duaine T.
Urban Transport Engineer, Louisiana Department of Highways, Box 4245 Capitol Station, Baton Rouge, Louisiana. July 5, 1957 for ASSOCIATE grade.

FIELDER, David G.
Design Engineer, Department of Traffic & Transportation, Room 702, City Hall, Houston, Texas. July 23, 1957 for ASSOCIATE grade.

GIVENS, Benjamin M., Jr.
Associate Civil Engineer, Brown & Blauvelt, 44 Cooper Street, Woodbury, New Jersey. August 6, 1957 for JUNIOR grade.

GORDON, William H., Jr.
Associate Traffic & Planning Engineer, Virginia Department of Highways, 1221 East Broad Street, Richmond, Virginia. July 22, 1957 for ASSOCIATE grade.

GROVES, Alvin L.
Junior Engineer II, City Hall, San Antonio, Texas. July 26, 1957 for JUNIOR grade.

HACKMAN, Richard S.
Assistant Traffic Engineer, Gannett, Fleming, Corddry & Carpenter, Inc., P. O. Box 366, Harrisburg, Pennsylvania. July 11, 1957 for JUNIOR grade.

HORWOOD, Edgar M.
Associate Professor of Civil Engineering, University of Washington, More Hall, U. W., Seattle 5, Washington. July 15, 1957 for ASSOCIATE grade.

INGOLD, Donald P.
Assistant Traffic Engineer, City Hall, Greensboro, North Carolina. July 26, 1957 for JUNIOR grade.

JACKS, Marshall, Jr.
Assistant Traffic Engineer, Department of Streets & Traffic, 735 Randolph Street, Detroit 26, Michigan. June 14, 1957 for JUNIOR grade.

KOLIN, Jakob
Partner, Kolin & Zahavi, Traffic Engineering firm, 4 Herzl Street, Tel-Aviv, Israel. July 22, 1957 for MEMBER grade.

MASCARI, John A.
Design & Planning Engineer, Bureau of Traffic Engineering, Room 6, City Hall, Indianapolis, Indiana. August 5, 1957 for JUNIOR grade.

McFARLANE, Douglas E.
Assistant Route Analysis Engineer, Ontario Department of Highways, Traffic Section, Parliament Buildings, Toronto, Ontario, Canada. July 10, 1957 for JUNIOR grade.

ORER, Mete
Urban Traffic Engineer, General Directorate of Highways, Karayollari Umum Mudurlugu, Trafik Fen Heyeti, Ankara, Turkey. July 15, 1957 for JUNIOR grade.

REYES, Raul Reyes
Civil Engineer III, Department of Public Works, Traffic Bureau, Stop 23, Santurce, Puerto Rico. July 31, 1957 for JUNIOR grade.

REYNOLDS, David J.
Supervisor, Public Transportation, P. O. Box 708, Coconut Grove Station, Miami, Florida. July 24, 1957 for ASSOCIATE grade.

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RICHTER, Jacques
Traffic Engineer, Wilbur Smith & Associates, 495 Orange Street, New Haven, Connecticut. July 24, 1957 for JUNIOR grade.

SAAG, James B.
Traffic Engineer, DeLeuw, Cather & Company, 150 North Wacker Drive, Chicago 6, Illinois. June 21, 1957 for JUNIOR grade.

SMITH, Charles L.
Assistant Highway Engineer, California Division of Highways, 150 Oak Street, San Francisco, California. July 5, 1957 for JUNIOR grade.

SMITH, Donald L.
Traffic Engineering Supervisor, Miami Department of Engineering, Division of Traffic, 3343 Pan American Drive, Miami, Florida. July 21, 1957 for ASSOCIATE grade.

SOLBERG, Alan I.
Associate Highway Engineer, Washington State Highway Commission, Transportation Building, Olympia, Washington. July 17, 1957 for JUNIOR grade.

STONE, J. R.
Senior Traffic Engineer, Texas Highway Department, 2309 Montgomery Street, Fort Worth, Texas. July 26, 1957 for ASSOCIATE grade.

WALKER, Esper L.
Road Designer, Expressway Section, Texas Highway Department, Highway Building, 11th & Brazos Streets, Austin, Texas. July 5, 1957 for JUNIOR grade.

ZAHAVI, Yacov
Partner, Kolin & Zahavi, Traffic Engineering firm, 4 Herzl Street, Tel-Aviv, Israel. July 22, 1957.

Strictly Business

Econolite Buys GE's Traffic Signal Business

Purchase of the traffic signal and control business of General Electric Company by Econolite Corporation of Los Angeles, for many years a leader in the west in the manufacture and distribution of this type equipment, has been announced by Arthur Loomis, president and Leo Jennings, executive vice president of Econolite.

The new move will greatly increase the scope of activities of Econolite which has made and distributed throughout the west traffic and pedestrian signals of its own design. The purchase of all assets and equipment of the General Electric traffic signal and control business, including patent rights, tooling and designs, will enable Econolite to enter and occupy a leading national position in the manufacture and distribution of traffic control equipment from coast to coast.

Plant equipment, tooling and stock is presently being moved from the General Electric Outdoor Lighting factory at Hendersonville, North Carolina to the Econolite plant at 8900 Bellanca Avenue, Los Angeles 45, California. Econolite's modern production and assembly facilities, plus the facilities being moved from Hendersonville, will enable Econolite effectively to fulfill the requirements of traffic engineers throughout the country.

Plans for the distribution throughout the United States of the Econolite line of traffic signal and control equipment will be announced at a later date.

Aubrey "Red" Matthews, who for many years has been associated with Econolite, has been named general sales manager. D. T. "Don" Carter, formerly manager of sales, traffic signal and control of General Electric Company, has been appointed manager of distributor sales. Roy H. Fielding, formerly of GE, has also joined Econolite.

New Catalog Now Available from Cataphote Corporation

Cataphote Corporation of Toledo, Ohio and Jackson, Mississippi, manufacturer of non-electric traffic control products, are now offering their new Catalog 65. It contains illustrations and descriptive material covering traffic and street name signs, both plain and reflectorized; reflective coating kits; reflective striping; reflective beads and various accessories. Also included are specifications; up-to-date price sheets, installation data and helpful tips on the use of these products.

A copy may be secured by writing Cataphote Corporation, Toledo 10, Ohio.

New Applicator for Perma-Line Shows Important Modifications

An improved applicator designed to increase still further the ease and economy of applying the street-marking material — PERMA-LINE — is being introduced by the Veon Chemical Corporation of Long Island City, New York.

Featuring a new automatic bead dispenser which evenly distributes reflectorizing glass beads to the surface of 3,500 feet of traffic line, the new applicator — called the PERMA-LINER — has been developed to apply crosswalk lines right up to the curb edge, thus eliminating possible blank areas and later touch-up applications.

Another important modification of the PERMA-LINER is a sturdy three-wheel base in place of the previous four wheels. Besides greater maneuverability, freer wheeling and steering, the rear wheel has a locking device which insures non-wavering, completely straight lines. The wheels are provided with semi-pneumatic rubber tires.

The machine, with a capacity of 150 pounds of PERMA-LINE, is hand propelled and gravity fed. The PERMA-

LINER extrudes the compound through readily interchangeable, precision tooled dies in widths ranging from 4" to 12".

The PERMA-LINER is propane gas heated and insulated with rock wool to guarantee maintenance of proper PERMA-LINE temperatures during application and prevent possible burns to workmen. A built-in agitator keeps the thermo-compound properly mixed for optimum results.

Weighing less than 200 pounds and encased in rust-proof aluminum, the PERMA-LINER is 38½" high, 36" wide and 54" long.

Reynolds Metals Issues Brochure on Sign Blanks

A new brochure on aluminum highway and street sign blanks, featuring a complete list of sizes and specifications for standard blanks, has just been published by Reynolds Metals Company.

Specifications are in accordance with those in the Manual on Uniform Traffic Control Devices for Streets and Highways.

Attention is also called to the company's engineering services, which offer assistance in any design and production projects involving the application of aluminum to highway market problems.

Copies of the brochure can be obtained by letterhead requests to Reynolds Metals Company, 2500 South Third Street, Louisville, Ky.

Training Opportunities

September 17-19—NATIONAL CONFERENCE ON INCREASING HIGHWAY ENGINEERING PRODUCTIVITY (4th of a series)—

Sponsored by AASHO, Association of Highway Officials of the North Atlantic States, Massachusetts Department of Public Works, M.I.T., and U. S. Bureau of Public Roads. All engineers, officials, consultants and others interested. At Somerset Hotel, Boston, Mass. For information, address: Mr. H. A. Radzikowski, U. S. Bureau of Public Roads, Washington 25, D.C.

September 23-27 — HIGHWAY MANAGEMENT TRAINING COURSE—

Sponsored by AASHO and the National Highway Users Conference. For highway engineers with some administrative experience who might be expected to devote some time to management training in their own departments. By invitation versity, Ithaca, N. Y. For information, address: Mr. Roy E. Jorgensen, National Highway Users Conference, 966 National to the department only. At Cornell Uni-Press Bldg., Washington 4, D.C.

September 30-October 1 — SECOND INTERNATIONAL WORKSHOP MEETING ON OFF-STREET PARKING —

Sponsored by American Municipal Association and Milwaukee Parking Commission. For city officials, engineers and technicians. For information, address: Mr. Martin E. Bruening, City Hall, Milwaukee 2, Wisconsin.

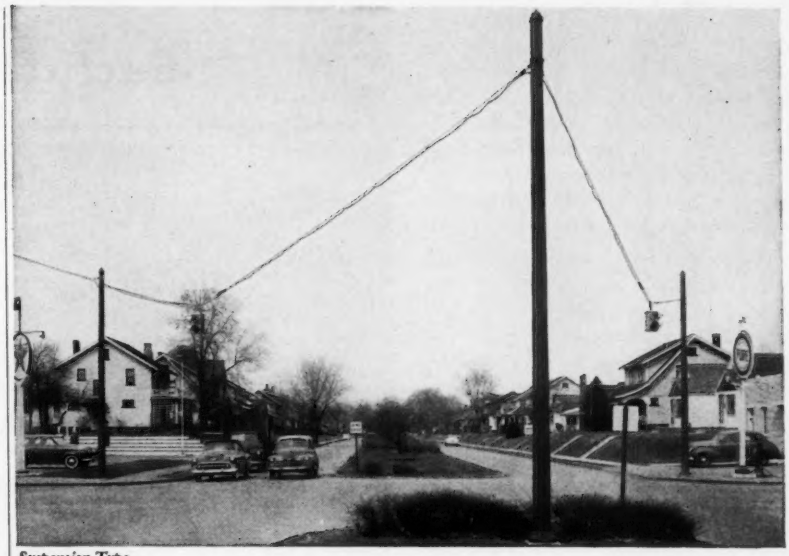
March 3-21, 1958 — TRAFFIC ENGINEERING SEMINAR —

Sponsored by Northwestern University Traffic Institute and the Midwest Section, ITE. For traffic engineers and others with engineering backgrounds. Tuition $165. For information, address: Northwestern University Traffic Institute, 1704 Judson Ave., Evanston, Ill.

PIONEERING THROUGH RESEARCH

(Continued from page 567)

The purpose of this study is to determine the relationships between the traffic flow, speed, volume, density and headway. The data needed for this determination will be obtained through the use of overhead radar detectors, which are connected to volume density computers and graphical recorders, and the use of radar speed meters also connected to graphical recorders. The data is collected in the field and transmitted over telephone lines to a central research and analysis laboratory on



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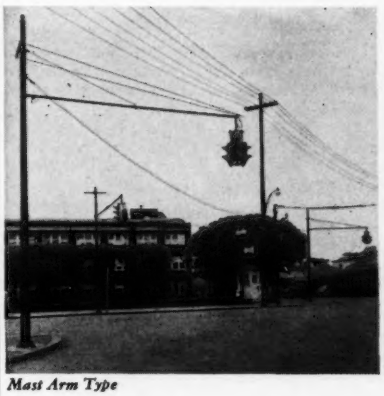

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UNION METAL | traffic signal poles

the campus of Michigan State University. The information that will be recorded will be volumes by one minute increments and individual vehicle speeds. These bits of information will be analyzed and correlated and used to determine a mathematical relationship of speed to volume, speed to density, headway and other relationships.

The control factor that is being used in this study is friction. There are four types of friction that affect the overall traffic flow; they are medial, marginal, internal, and intersectional. The latter will be neglected as this study is performed at a point in mid-block. The other three frictions are controlled by carefully selecting the section to be used.

The initial site selection on M-43 (Michigan Avenue) between Cooper Street and Reniger Court was chosen because of convenience. It is a major traffic artery; it has certain desired traffic characteristics, no access control, and it is a six-lane wide median highway. The equipment is mounted on an overhead beam type structure especially adapted for the radar equipment. This is a permanent location which will be used for other controlled traffic flow studies. There will be in addition to this permanent station, eight temporary locations. Each temporary location will be studied for a two-week period with one week for set-up and testing.

This study is a pilot study and will be an aid in setting up a complete study. It will also show possibilities for expressway surveillance or the possible use in traffic control devices.

There are other research projects being instituted with both State Universities and we are optimistic that the results to be gained will be of overall benefit. Michigan is ready to cooperate with national agencies devoted to traffic research so that we can contribute to projects assigned to this area and in return, be able to share the results of experimentation performed elsewhere.

The Michigan State Highway Department is strongly dedicated to the principle that the road is no better than the service it gives to the public; therefore, traffic engineering will be one of the controlling factors in our work program. We take great pleasure in welcoming you to Detroit on September 23rd and hope to be able to serve you at the convention.

Section News

Lt. Leonard Johnson of the Denver Police, in a 1915 Model T. Ford, chauffeurs Al Pepper (rear, far side), Colorado's traffic engineer, Jack Bruce (rear, nearest camera), Denver's traffic engineer, and Jim Reading (front seat), San Diego's traffic engineer, at the Western Section meeting in Denver, June 1957.

CANADIAN SECTION

News Briefs

London, Ontario—Frank Gillies has been appointed Marketing Manager of the Reflective Products Division of the Minnesota Mining and Manufacturing Co.

Toronto, Ontario—Phil Wade of the Ontario Department of Highways has been awarded the Armco Drainage Good Roads Fellowship ($2000) to study Highway Planning at the University of California.

Toronto, Ontario—Walter Macnee announced that he is the proud father of a daughter—Nora Elizabeth—a sister for Walter Jr.

Toronto, Ontario—I wish to apologize for the omission of *Ed Ewen's* name in the list of O.T.C. directors published in the last newsletter. Ed is one of the more active ITE members in the Ontario Conference and because of this has been elected to the Directorate.

London, Ontario—The City of London is looking for a Traffic Coordinator. All inquiries should be directed to Mr. E. T. Skelton, City Engineer.

Hamilton, Ontario—Art Lomax is anxious to hire a traffic engineer to assist him in the many problems of traffic control in the City of Hamilton. Further information can be obtained by contacting Art.

Toronto, Ontario—John Vardon of the Ontario Department of Highways is taking a leave of absence to study at Queen's University under the auspices of the Joint Highway Research Project sponsored by the Provincial Government.

Toronto, Ontario—Bob Burton is moving out of his present office building to new quarters at Room 401, 129 Adelaide St. W. His former office is to be demolished to make way for John Walker's Underground Parking Garage which is scheduled for completion in June, 1958.

Toronto, Ontario—R. F. "Andy" Anderson—one of our newly elected affiliate members and secretary-treasurer of the Ontario Traffic Conference, has published the first O.T.C. Newsletter. Andy is to be complimented on this very fine effort.

Calgary, Alberta—"The Western Canada Traffic and Parking Association" will hold its first meeting in Calgary on October 3rd and 4th. Further details on this newly formed group can be obtained from *W. D. Grant,* Traffic Engineer of Calgary.

METROPOLITAN NEW YORK SECTION

—from Section Newsletter

MAY 23rd MEETING NOTES

The annual meeting of the 1956-57 year was a dinner meeting held at the National Arts Club on Thursday, May 23, 1957. Thirty-four members and guests attended this, the seventh and final meeting of the year.

President *Warren Quimby* called the meeting to order at 8:00 P.M. and introduced Honorary Member *Charles J. Tilden* as a member who came from Sydney, Australia, to attend the meeting. Mr. Tilden, who is 83 and one of the charter members of the Institute, received a warm welcome from the group. He spoke briefly on his extensive travels, remarking particularly on the solidarity of English-speaking peoples throughout the world.

Ernie Boulding reported on the activities of the News-Letter Committee. He stated that eight issues had been published so far this year, and that another issue would be published after this meeting.

Larry Lawton presented the report of the Membership Committee. Due to the formation of the Mid-Atlantic Section, we lost 3 active Institute members by transfer during the year. However, the Section gained 7 new active Institute members by transfer from other sections and by election to the Institute. In addition, the three people recommended by the Membership Committee as local section affiliates were so elected by the Section. The New York

Metropolitan Section now has 90 dues-paying members, 77 Institute members and 13 local section affiliates.

President Quimby reported that the committee of the Section which was studying curb parking for the Institute Technical Council had had two meetings during the year. The committee has reviewed the material gathered by the previous technical committee, and has drawn up the outline of a suggested policy. Members of the committee are now reviewing specific sections of the suggested policy.

The officers of the Section for 1957-1958 were elected. They are:

President.....*H. Jack Leonard*
Vice-President.....*Arnold G. Fisch*
Sec'y.-Treas.....*Gordon K. Gravelle*

John Crosby of the Program Committee then introduced the speaker of the evening, Mr. Roy Haeusler, Chief Automotive Safety Engineer of the Chrysler Motor Corporation, who spoke on automotive safety research and development.

MID-ATLANTIC SECTION

—from Section Newsletter

Lew McIntyre has just completed an extensive tour of ten European countries. He promises to write about some of the traffic facilities of these countries at a later date. Nice work if you can get it.

Mike Gittens and some of his boys are finding that these new interchanges leading into the downtown area aren't going to solve all the traffic headaches. In fact, some new ones are going to be added.

Bill Froehlich and his Public Parking Authority are going in for some metered parking lots in the outlying districts of Pittsburgh. If we can get enough lots we may be able to open some of our streets for vehicular traffic—then watch traffic roll.

Tony Miscimarra, family, and a few neighbors got together and spent a safe, sane Fourth right in their back yards. The outdoor grills, swimming pools, badminton sets were all going full blast. The results were Tony's sprained big toe, a neighbor's wrenched right arm, one bloody lip when a child fell in the pool and one dozen belly-aches. Net result: one safe, sane Fourth.

A large percentage of the membership of the Mid-Atlantic Section is either actively participating in or supporting a proposal by the Department of Highways to undertake comprehensive transportation surveys in the cities of Pittsburgh and Philadelphia, each of which surveys would encompass the metropolitan areas of these two cities. Without a doubt, both of these surveys when conducted will have on their operating committees almost a duplicate roster of the Mid-Atlantic Section.

The Delaware State Highway Department has made public the alignment of all Interstate Routes in Delaware and completed public hearings on all but FAI-3, the eastern route around Wilmington. On June 20th the City Council of Wilmington approved one of the State Highway selected routes through the western part of Wilmington for the FAI-2 freeway.

Work on the Interstate Highway Program is keeping *William (Bill) Miller* extremely busy in his capacity as Deputy Chief Engineer.

David K. Witheford was recently appointed Traffic and Planning Engineer for the Delaware State Highway Department and *William R. Carrow* was promoted to Assistant Traffic and Planning Engineer.

PUERTO RICO SECTION

On July 10, 1957, the first meeting of the Puerto Rico Section was held at the Colegio de Ingenieros Building in San Juan. All the eight local members of the ITE were present, plus a number of other engineers interested.

The correspondence received from the Executive Secretary of the ITE was brought to the attention of the members and a nominating committee was appointed by the organization group. Votes were canvassed and the following officers were elected for the current fiscal year.

President.....*Mr. Salvador M. Padilla*
Vice President....*Mr. William Vivoni, Jr.*
Treasurer....*Mr. Juan F. Vives Meléndez*
Secretary.....*Mr. Victor M. Labiosa*

In the business meeting that followed, various matters concerning the Section work-program were discussed. President Padilla emphasized the technical goals of the organization and urged a strong membership campaign.

As the first Section activity on July 23, 1957, Mr. Robert J. Allen, Assistant Manager of the Accident Prevention Department of the Association of Casualty and Surety Companies, gave a lecture on the most important traffic problems he has observed in Puerto Rico. He discussed with the group the various possible improvements that can be carried out to reduce traffic accidents.

7 ADVANCED ENGINEERING IMPROVEMENTS

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A Sensation For Emergency Traffic Control

The "Traffic Sentry" Portable Traffic Signal has been completely re-engineered to bring you 7 big improvements that completely revolutionize its use, service and versatility. 1. All aluminum light-weight head with each lens opening individually. 2. New specular aluminum, highly polished reflectors, alzac process. 3. Improved design aluminum visors greatly increase visibility. 4. New 12-volt electrical system. 5. New, stronger, one-piece welded, reinforced, heavy-gauge steel pedestal-base, smaller size. 6. Improved, fully automatic, flotation equalizer, heavy-duty charger mounted in pedestal-base. 7. New, more positive, greater cycling range controller mounted in pedestal-base for easy access.

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CHANNELS AND SIGNALS EXPEDITE TRAFFIC FLOW

This busy intersection of a county road (Seven Mile) and city street (Pontchartrain) handles 50,000 vehicles daily, in addition to serving as a major bus transfer point for the DSR (Detroit Street Railways). The intersection recently was re-channelized and re-signalized by the Board of Wayne County Road Commissioners with the City of Detroit participating in the design and costs.

PIONEERS IN ROADBUILDING

(Continued from page 563)

These improvements consist of 244 new "Stop & Go" signal installations, 44 flashing beacon installations, and 134 locations where existing "Stop & Go" signals have been rebuilt in a modernization program. There are 75 locations on the current year's program for signal improvements, and a like number of improvements are planned for 1958.

The cities of Detroit and Dearborn operate a number of traffic signals on county roads within their corporate limits. There is excellent cooperation with the municipalities in coordinating signal timing to provide progressive vehicle flow on these roads. A common "Gong" system, developed by the Public Lighting Commission of Detroit, is used to fix signal off-sets.

In cooperation with the railroad companies and as directed by the Michigan Public Service Commission, grade crossing signals have been installed at 38 highway-rail locations during the past ten years. Today railroad crossings at grade are protected by automatic flasher signals and gates at 26 locations on the county roads, and by automatic flashers at 73 additional locations. Also, the Board of Wayne County Road Commissioners is responsible for maintenance of 91 railroad grade separations.

A modern Paint and Sign Shop, outfitted with automatic equipment and staffed with some 30 men, does a herculean task annually with the installation of pavement markings and traffic signs. The shop operates under supervision of the Board's Maintenance Division, with the Traffic and Safety Division programming all new or revised installations of traffic control devices.

During 1956, two road marking crews, composed of teams of six men each, painted 1,681 miles of lane lines. Forty per cent of the paved road mileage require multiple lines. This work consumed 8,341 gallons of yellow, 10,266 gallons of white, 1,862 gallons of black paint, and 117,150 pounds of reflective beads.

By actual count, the shop in 1956 painted a total of 10,848 signs. An average of some 1,000 signs per month are installed on roads maintained by the Board of Wayne County Road Commissioners, either as new installations or as replacements for signs suffering from exposure or obsolescence.

At the request of the Michigan State Highway Department, the shop presently is erecting 72 overhead trusses which carry large reflectorized sign panels on the expressways. These signs, of the latest design and mounted directly over the travel lanes, are easily read by drivers passing under the supporting structures at expressway speeds.

The safety and convenience of motorists at detours around construction projects are stressed by the Board of Wayne County Road Commissioners. Establishment of detours involves extensive use of illuminated and reflectorized signs, along with barricades, guard posts and pavement markings. To encourage uniformity in signing, contractors on state and county projects are furnished on a loan basis signs required to post detours or to safeguard motorists and workmen in construction areas.

Handling of an average of 600 requests, complaints and reports on traffic matters monthly by the Traffic and Safety Division is in itself a major task. Suburban development is requiring ever increasing attention to traffic regulations.

By resolution of the Board of Wayne County Road Commissioners, authority is established to install certain traffic controls, such as signals and "Stop" signs. Speed zones and parking regulations are established by joint resolution of the Board and the Michigan State Police Commissioner.

Wayne County joins with Detroit and the State of Michigan in welcoming members and guests of the Institute of Traffic Engineers at their 27th Annual Meeting this September 23rd to 27th. May your visit prove a safe and pleasant journey.

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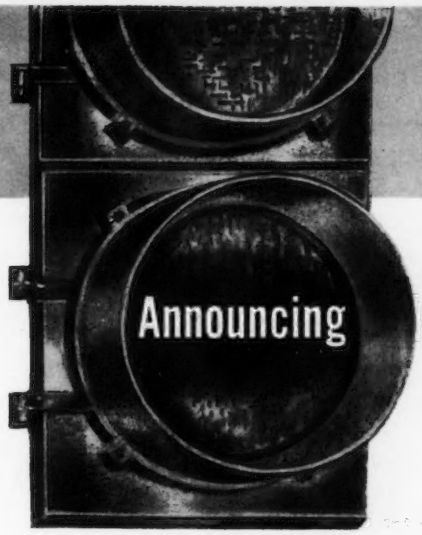
Complete kit ONLY $69.50

Here's everything you need to give hazards nighttime visibility so they can be seen. "Codit" Reflective Liquid sprays on, brushes on. Gives you safety for just 17¢ per square foot. Buy several kits from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minn.

Kit contains 6 oz. spray cans, 4 lb. cans, brushes, stencils, plans, instructions.

PRODUCT OF 3M RESEARCH



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ITE LIFE INSURANCE PLAN REOPENED FOR PARTICIPATION

Special Convention Enrollment Period extends from September 15 through October 15 inclusive

In answer to many requests the insurance company is arranging a special enrollment period from September 15 through October 15 inclusive to enable members who have not already joined to do so.

In brief the life insurance benefits available are as follows:

Classification	Age	Amount of Insurance
Junior Member	64 or under	$ 5,000
	65 or over	2,500
Associate Member	64 or under	7,500
	65 or over	3,750
Member or Affiliate	64 or under	10,000
	65 or over	5,000

The first premium for the above coverage for the period from September 15, 1957 to February 15, 1958 will be:

Junior Member	$12.50
Associate Member	28.13
Member or Affiliate	50.00

Subsequent premiums for members joining the plan during this special enrollment period will be billed semi-annually and they are as follows:

Junior Member	$15.00
Associate Member	33.75
Member or Affiliate	60.00

Here are a few highlights of the plan:

Insurability

No evidence of insurability is required from members who subscribe during this Special Enrollment Period.

Effective Date

Insurance purchased during this period will be effective as of September 15, 1957.

Options of Settlement

All or any part of the insurance proceeds (if at least $1,000) may be paid in installments for a guaranteed period, or for life, or held at interest with the insurance company, as the participant or his beneficiary may elect.

Total Disability

In the event the participant becomes totally and permanently disabled before age 60, his contributions to the Plan will be waived, and the insurance continued until the time of his death, provided satisfactory proof of continued disability is submitted to the insurance company.

Changes of Beneficiary

Any insured participant may change the beneficiary entitled to receive his insurance, at any time, by filing a written request for such change with the Trustees.

Underwriters

This plan is underwritten by the Union Mutual Life Insurance Company of Portland, Maine. Founded in Maine in 1848, Union Mutual is America's 8th oldest life insurance company. Today, it is one of the 10 fastest-growing life companies in the country.

With policyowners in every state, Canada, Hawaii and Puerto Rico, Union Mutual is known and respected for exemplifying the high ideals of New England life insurance tradition.

Certificate of Coverage

The Insurance Plan provides that the Trustees will procure and pay for individual term life insurance policies on the life of each participant, with the benefits payable to the beneficiaries designated by the participant. The Trustees will own the policies and deal with the insurance company, and the member will receive a certificate from the Trustees indicating the amount of his insurance.

Save time out of your busy convention schedule by joining the plan now. Simply fill out the subscription form below and mail it with your check to ITE headquarters in Washington.

SUBSCRIPTION FORM

FOR USE ONLY BETWEEN SEPTEMBER 15 AND OCTOBER 15, 1957

The undersigned, hereinafter described as the Subscriber, hereby subscribes to the Agreement and Declaration of Trust made as of January 5, 1957, between the Institute of Traffic Engineers, Incorporated, and the Trustees named therein, and the various members of the Institute who subscribe thereto, and the Subscriber also hereby subscribes to the Insurance Plan referred to in said Agreement and Declaration of Trust.

The Subscriber agrees to furnish the Trustees upon written request therefor any information as to the Subscriber which may be required in connection with the operation of the said Trust and Insurance Plan. The Subscriber agrees that no acceptance by the Trustees of contributions shall constitute a waiver of the terms, provisions or requirements of the Plan for participation therein.

Date_____, 19_____

_____

Subscriber's signature

_____

Address

_____

Institute Affairs

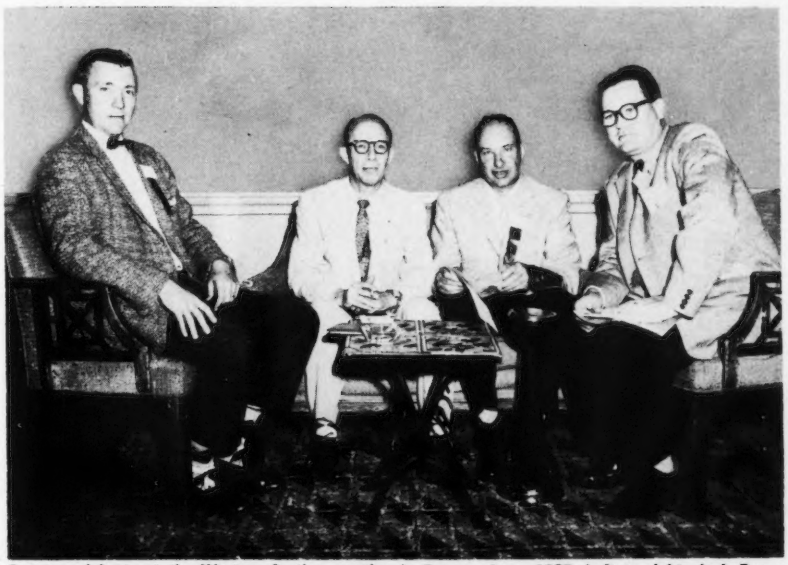
27th Annual Meeting

At this time every year the attention of members of the Institute centers on the Annual Meeting. The Detroit people, under the able leadership of General Chairman Al Malo, have planned an interesting meeting, providing a good balance between technical sessions and the lighter side. The program as it stood in the middle of August is printed in this issue—those of you coming to Detroit will receive a final edition of the program at the registration desk.

It is hoped and confidently expected that attendance at this 27th Annual Meeting will be the greatest ever recorded at an Institute affair. To help make sure that everyone was invited, the Detroit Committee obtained the help of radio station WJR and recorded a message from Chairman Malo which was made available as a transcription for all local sections. We hope that many of you heard Al's voice inviting you to the meeting this month.

In addition to the events listed in the printed program, several other sessions will be held for smaller groups. The Board of Direction will meet Saturday and Sunday, September 21 and 22. The new Board will have a meeting the Friday after the convention. Many of the technical committees are planning to have meetings, generally scheduled for Monday morning. Room assignments will be available at the registration desk that morning.

As previously announced, an innovation this year will be a breakfast meeting, scheduled for Monday, September 23, to be attended by the officers of local sections and members of the Board of Direction. Originally conceived as a get together for local section presidents and national officers, the group has grown now to the point where many sections will be represented by three or four officers. It is hoped that the meeting will result in some valuable discussions about section activities and programs and will thus make section meetings more interesting and more valuable next year.



Guests and hosts at the Western Section meeting in Denver, June, 1957. Left to right: Jack Bruce, Denver; Carl McMonagle, ITE President; Al Pepper, Colorado and outgoing president of the Section; and Joe Havenner, ITE Vice President.

Life Insurance Again Available

By vote of the Trustees of the Institute's life insurance plan and with the approval of the Board of Direction, a second general enrollment period has been established to begin September 15 and end October 15, 1957. This enrollment period will operate in the same fashion as did the first general enrollment period last winter, in that all members of the Institute may join the plan during this 30-day period without medical examination.

More than 300 members joined last winter, and a large number of new members elected by the Board in June have already come into the plan. There have been a number of requests from other members who did not subscribe during the initial period, however, and the Trustees believed they were justified in establishing a second short general enrollment period.

In the front row at the opening session of the Pan-American Highway Congress, August 1, in Panama. Left to right: W. A. Bugge, director, Washington State Highway Department and president, AASHO; W. G. Eliot 3d, U. S. Bureau of Public Roads, (Assoc. Mem., ITE); E. G. Wetzel, Port of New York Authority and Secretary-Treasurer of ITE; D. Grant Mickle, Automotive Safety Foundation and official ITE representative; Burton W. Marsh, AAA, (Hon. Mem., ITE); and J. O. Mattson, president, Automotive Safety Foundation (Affil., ITE).

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Cox & Stevens electronic motion-weighing equipment is now installed in Iowa, Virginia, Minnesota and Oregon. Find out how these scales of the future can help your highway planning program today.

FEATURES OF COX & STEVENS ELECTRONIC HIGHWAY SCALES

- ☆ Built-in Experience — Developed in cooperation with the Bureau of Public Roads.
- ☆ Compact Scale Instrumentation — Portable if necessary.
- ☆ Easily Serviced — Plug-in Components for quick, simple maintenance.
- ☆ Accurate at Wide Speed Range — Records true weights at all normal truck speeds.

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The life insurance company was willing to authorize this enrollment period, although they pointed out that sufficient members had already enrolled to make the plan a success. As evidence of their interest and cooperation, they are making a representative available who will be in Detroit to answer questions from members about the life insurance program. He will have a desk near the registration desk —don't hesitate to talk to him if you have any questions about the plan or the insurance policy.

On page 586 is reproduced the subscription form which should be signed and mailed to the Institute headquarters office in Washington. You will then be asked to fill out a more detailed application form which will eventually go to the insurance company.

The Trustees hope that a number of members not now enrolled in the plan will subscribe. They are convinced that the plan is a good one and worth your earnest consideration.

Membership Requirements

As all voting members of the Institute know, the Board of Direction has approved several proposed amendments to the Constitution and By-Laws, all relating to membership and membership qualifications. Copies of the proposed changes were mailed to Members and Associate Members early in August, together with a covering letter of explanation.

The changes proposed are designed in general to raise the standards of Institute membership. In addition, they incorporate in the By-Laws definitions of professional experience which will be helpful to the membership committee in evaluating an applicant's qualifications. No fundamental changes are proposed, but the trend is toward membership requirements of the American Society of Civil Engineers and the other founder engineering societies.

An opportunity will be provided at the Annual Business Meeting on Thursday, September 26 for full and complete discussion of these proposals. Under terms of the present By-Laws, these amendments as proposed by the Board of Direction may be amended at the Annual Business Meeting. The proposals as finally agreed to at this meeting must then be submitted to the entire membership of the Institute for mail ballot. This will be done within 30 days after the Detroit meeting.

(Continued on page 603)

Positions Available

ALHAMBRA, CALIFORNIA

Position: Traffic Engineer.
Requirements: Graduate civil engineer with traffic specialization and three years traffic engineering experience; or equivalent combination of training and experience. Examination to be given by Civil Service Trustees.
Salary: $555 to $694 per month (tentative)
Apply: Personnel Department, 201 W. Main St., Alhambra, Calif. Probable closing date, Oct. 1, 1957.

NEW HAVEN, CONNECTICUT

Position: Traffic Assistant.
Requirements: Graduate engineer with one year's experience or advanced training in traffic engineering. Capable of supervising the planning and installation of traffic signs, signals and markings.
Salary: $5,450 per year.
Apply: William R. McGrath, Director of Traffic & Parking, Hall of Records, 200 Orange St., New Haven, Conn.

GREENSBORO, NORTH CAROLINA

Position: Assistant Traffic Engineer. To assist City Traffic Engineer in established Traffic Engineering Department in all phases of Traffic Engineering work.
Requirements: Engineering graduate with undergraduate training or 1 year experience in highway design.
Salary: $440 to $536 per month with maximum salary obtainable through merit increases.
Apply: Donald P. Ingold, City Traffic Engineer, City Hall Annex, Greensboro, North Carolina.

LOS ANGELES, CALIFORNIA

Position: Traffic Engineering Associate.
Requirements: Engineering graduate from a recognized 4-year college (or possession of California EIT Certificate) and three years of experience in traffic engineering. Graduate work leading to master's degree may be substituted for one year of experience. Written exam given October 19 in Los Angeles and major cities.
Salary: $545 to $677 per month.
Apply: Room 5, City Hall, Los Angeles, California.

TRENTON, NEW JERSEY

Position: Principal Engineer, Traffic.
Requirements: Prefer graduate engineer with several years traffic engineering experience. A competitive examination will be conducted by the N. J. Civil Service Commission in Trenton. Closing date for applications is September 30, 1957.
Salary: $6420 to $7620, with liberal pension and life insurance plan.
Apply: New Jersey Civil Service Commission, State House, Trenton, N. J. Details of duties and working conditions available from Otto P. Ortlieb, Traffic Engineer, City Hall, Trenton, N. J.

ST. LOUIS COUNTY, MISSOURI

Position: Traffic Commissioner.
Requirements: Registered professional engineer with five years traffic engineering experience, at least two of which were in responsible charge.
Salary: $9600 a year, with the minimum appointment a term of four years.
Apply: Richard J. Childress, Vice Chairman, St. Louis County Traffic Commission, care of St. Louis University, 3642 Lindell Bldg., St. Louis 8, Mo.

UNIVERSITY OF ILLINOIS

Position: Instructor or assistant professor in traffic engineering. The person in this position will be responsible for some graduate courses in Traffic Engineering; will be in direct charge of some resarch in this field; and will be the Assistant Director of the Annual Illinois Traffic Engineering Conference. For a person interested in teaching and research this position offers an excellent opportunity for a very satisfying career in the field of Traffic Engineering.
Qualifications: A BS degree in Civil Engineering; a MS degree in Civil Engineering or intent to achieve such a degree; practical experience in Traffic Engineering, and a sincere interest in teaching and research, initiative, and willingness to take responsibility.
For further information contact: John E. Baerwald, Associate Professor of Traffic Engineering, University of Illinois, 401 Civil Engineering Hall, Urbana, Illinois.

SAN JOSE, CALIFORNIA

Position: Traffic Engineering Assistant.
Requirements: Engineering graduate with one year's traffic experience or graduate study; or two year's college and three year's traffic experience. U. S. citizen, 21 to 40 years old.
Salary: $464 to $580.
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Reference Notes

PLANNING OF MASS TRANSIT ROUTES

A report of Technical Committee 3-D of the Institute of Traffic Engineers, approved as an Information Report by the Technical Council and the Board of Direction and authorized for publication.

1. *Scope*

The discussion herein concerns general planning for mass transit routing and the character of planned routes. A great many factors that have an impact on routing plans such as organization, finance, type of equipment, detailed scheduling technique and fare structures are not specifically discussed except as they are related to transit routes.

2. *Basic Concept*

The principal objective of mass transit is to provide relatively attractive low-cost transportation along regular routes to groups or masses of people. It is important to recognize that general acceptance of mass transportation will relieve traffic congestion and minimize expenditures for traffic and highways by utilizing them more efficiently. Low cost service is made possible by gathering a sufficient number of passenger fares to defray the cost of service which would be excessive if personalized service were to be furnished to each individual from origin to destination at the times desired. Thus, transit service is economically possible only where comparatively large numbers of persons are to be moved over regular routes.

The planning of mass transit routes must necessarily make provisions for changes in the desires and needs of the majority of the users of the service. In addition, the planning of routes requires that consideration be given to the most efficient use of street patterns and traffic control measures. The constant growth of traffic volumes results in the development of new areas of congestion, and the construction of new facilities gives planners many opportunities to approach their problems with a new concept. Since traffic and transit planning can only be tentative, it must therefore be flexible. Opening of new thoroughfares, bridges, and causeways; development of new neighborhood centers and new institutions; urban redevelopment and renewal; use of latest traffic engineering techniques; growth and spread of industry; as well as changes in public needs call for flexibility in planning so that public interest may be best served. Co-operation between transit officials and public officials aids in planning the most efficient use of streets and enables the transit operator to provide service which is more efficient and convenient.

3. *Acceptance*

In order to attract the necessary patronage, mass transit must provide a service which is acceptable to its patrons. This acceptability is obtained by providing service between many points of origin and many destinations, that is (a) convenient, (b) safe, (c) comfortable, and (d) economical. These characteristics are discussed below.

4. *Convenience*

Convenience is considered here under the headings of availability, travel time, and dependability.

(a) *Availability*—

Public transit availability is measured in the terms of time and place. Normally transit service is considered available as to place when it is not more than ¼ mile from the passenger's place of origin or destination. This is an approximate standard that has been developed through long usage. In thinly populated areas, or where there are limiting circumstances, a standard in excess of ¼ mile is acceptable. In densely populated areas, lesser distances may be justified or result naturally as in the case of convergence of lines in the central business district. A measure of over-all coverage is provided by the ratio: total population residing within ¼ mile of a transit line divided by total population of the community (or metropolitan area).

Availability as to time is measured by frequency of service. From the economic viewpoint, frequency of service is determined by the number of people to be carried during any given period of time and the number of vehicles required for their transportation. The number of patrons is dependent to a considerable extent upon proper spacing of routes. If routes are located too close together, patronage of each line is diminished and only long headways may be then justified on individual routes. If fewer routes are used to serve the same area, patronage will be more concentrated on the remaining routes and more frequent service can be provided thereon.

For reasons of convenience to the public, limiting headways, such as prescribed maximum time between successive vehicles at night or on holidays, may be established even though such limitation may result in uneconomical operations. Under such conditions the loss caused by this uneconomical operation must be borne by the more profitable operations.

In the final analysis, frequency of unsubsidized service is determined by public demand at the fares the public is willing to pay to sustain such service.

(b) *Travel Time*—

The time required for a passenger to complete his transit trip is a highly important factor to him. In addition to walking time, it consists of the time spent waiting for a vehicle (considered under (a) above), time spent on transit vehicles and, where involved, time consumed in effecting transfer(s) from vehicle to vehicle. Walking time to and from transit lines is controlled by spacing of lines and stops, and by the directness or indirectness of the street (sidewalk) layout leading to the transit stop. Layout of subdivisions should provide for ready and direct access to transit stops. Early co-ordination of transit routes with proposed subdivision layouts should be effected by transit operators, city planners, and developers.

Time spent on the vehicle is influenced by length of route and speed of travel. Length of route is minimized by directness of routing and is increased by circuity. However, speed of the vehicle is limited by frequency and duration of stops, type of roadway and traffic conditions, fare collection and fare system and, to some extent, by types and conditions of vehicles.

In general, the closer service stops are spaced, the slower will be the over-all speed of the transit vehicle. It is readily evident that the delays

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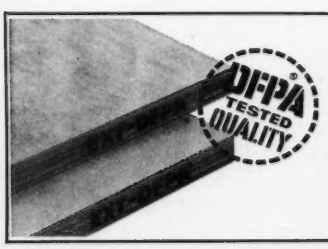

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caused by service stops consist of the time lost in decelerating and accelerating and the time spent loading and unloading passengers. Obviously the fewer the stops, the less will be the time lost due to deceleration and acceleration; hence, an effort is made to increase the distance between normal service stops to a minimum of approximately 750 feet. Greater spacing may be advisable on very long lines. However, greater spacing further increases walking distances of patrons and adds to their inconvenience even though travel time may be decreased thereby. Another advantage of increased spacing between service stops is that such arrangement adds to the dependability and reliability of schedule adherence. The farther stops are spaced apart, within reason, the greater will be the number of patrons per stop; and the probability of these stops being used is therefore greater than the probability of use of closer spaced stops. Thus, rather definite delays can be anticipated and allowances for same can be made in transit schedules. Better adherence to schedules can be obtained, thereby increasing the reliability and dependability of the transit service in addition to decreasing travel time and cost of operation.

The time lost due to loading and unloading varies with the number of patrons being accommodated. However, such factors as door arrangement and design, fare collection system, fare structure, transfer arrangements and identification of zone fares also have an influence on the time required for loading and unloading. When transit vehicles operate on very close headways at heavy loading points, it is sometimes desirable to have the service stops located at closer intervals so that the headways will not be limited by excessive loading and unloading time since normally headways can be no less than the time required for loading and unloading at any one point on the line — unless simultaneous loading of multiple vehicles is employed. Thus, where loading is heavy enough to cause spread of headways, it may be possible to decrease headways by shortening the distance between service stops even though the running time may be increased somewhat. Where rails and trolley overhead are not involved and traffic conditions permit transit vehicles to pass each other, separate stops may be designated for different routes operating on the same street.

Normally, in the interest of expediting the safe movement of all vehicular traffic, transit vehicles should not overtake and pass each other going in the same direction on a public street. Moreover, the same interest demands that, where transit vehicles operate along with other traffic within a common roadway, all transit vehicles moving in the same direction be confined to a single lane. It is highly desirable that all transit vehicles operated in a single direction have similar operating characteristics, such as acceleration and deceleration. Generally, bus operation is more flexible and more nearly conforms to general traffic characteristics than do transit vehicles which are confined in their operation by rails or trolley overhead. Where the transit fleet is composed of vehicles of dissimilar operating characteristics, it is highly desirable in the selection of routes that only vehicles of the same operating characteristics be operated in the same roadway. The use of one type of transit vehicle in a congested area, rather than the use of both buses and vehicles with fixed overhead, aids municipal officials in planning traffic movements to the best advantage of all users of the street.

The separation of mass transportation from vehicular traffic has proven to be the most effective way of expediting transit movements through congested areas. Cities having subway systems, or a combination of both subways and private right-of-way, experience less difficulty with traffic delays. The grade separation of transit vehicles from motor vehicles; the provision of private right-of-way; and the construction of suitable bus operating facilities where new expressways are being built, or where development permits the rearrangement of transit operation, will give mass transit advantages that cannot be obtained through other routing plans.

Delays occasioned by traffic conditions are influenced primarily by the volume and composition of traffic, the design of the roadway, and the traffic control measures employed thereon. Because the bulk of local service must be provided over local streets, obviously these roadways should be designed and operated to facilitate transit operation. Divided roadways of adequate width and quality of paving facilitate both transit and pedestrian movement. Adequate turning radii and provisions for loading and unloading, including recessed curb loading zones, should also be considered in design of the roadway. Since only surface transit is being considered here, the use of high speed expressways for local service is excluded unless special facilities are provided to allow pedestrians to gain access to the transit line without exposure to expressway traffic.

Equally important as design are the control measures employed. Ordinarily transit streets should be "right-of-way" or "through" streets which are protected by design, stop signs, signals or other control measures from undue interference from side or cross street traffic. The elimination of curb parking at specific times and places greatly facilitates transit operations.

One-way streets reduce delays for transit vehicles since results indicate that properly designated and controlled one-way streets will improve the operation of traffic.

Designation of special lanes or possibly even streets for exclusive transit use at certain times may be warranted as well as special traffic signal indica-

(Continued on page 596)

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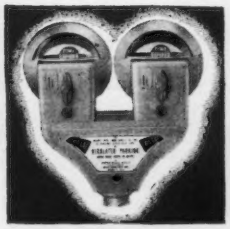

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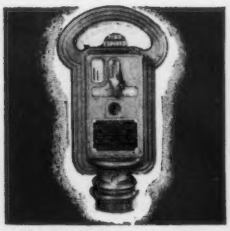

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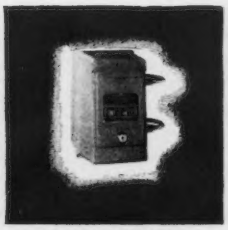

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(Continued from page 592)

tions and preferential timing of signals. The adoption of exclusive lanes or streets permits transit operating companies to combine routes, thereby making full use of the advantages obtainable, including better supervision at the same or less cost. By combining routes, transit operators free other streets for vehicular traffic and permit traffic officials to use these streets to the best advantage for vehicular movements.

Possible time savings may be effected through express service. This service usually consists of the transit vehicle providing normal local service at the outer and inner ends of the line and through service on the intermediate portions except for stops at transfer locations. In order to justify express service, there must be sufficient patronage to provide full vehicles at reasonable headways. Unless such patronage is available, the saving in passenger time gained by a change to express operation will be nullified or lost because of increased headways which will result where a vehicle is not allowed to pick up passengers on the express portion of the route. Therefore, savings in running time must be weighed against increased waiting time due to lengthened headways. Normally, express operation for a considerable distance is necessary to effect an overall saving in time. Provisions must be adequate for interchange of passengers at transfer points. Incidentally, this latter condition does not exist at most of our present grade separations.

Obviously, one way to minimize time lost due to transfers is to minimize the number of transfers required. Through riding is obtained by establishing transit routes according to predominant passenger "desire lines." Such routes may result in extremely long lines with an overabundance of service at their outer ends. This would be accompanied by uneconomical operation. One method that can be utilized within limits is "cut-back" or "turn-back" service where some of the vehicles are turned back short of the end of the line. This practice may result in unbalanced loading. Therefore, it may not be practical from the schedule and operating points of view even though loads may be balanced to some extent by use of uneven headways. Crosstown routings from one end of the city, through the central business district, to another end may be effective in minimizing transfers but may be uneconomical unless accompanied by balanced loading. Service to locations other than the central business district warrant special attention. This service is usually of a local nature, such as to schools and neighborhood shopping centers and local industrial and commercial activity from the predominant movement. Such movements should not be unduly penalized.

(c) *Dependability*—

This quality of service is characterized by adherence to schedules both as to time of passing any given location and also elapsed time aboard the vehicle. This factor is especially important where long headways are involved. The posting and/or distribution of schedules promotes greater convenience to the user and stricter adherence by the operator.

Irregular service, irregular headways, and the bunching of transit vehicles which tends to be accumulative, are of course highly undesirable and are symptomatic of either poor transit planning and operation or of erratic traffic conditions which cause unusual transit delays which cannot be anticipated and for which allowances cannot be made in operating schedules.

Adequate planning of transit schedules is necessary to insure workable schedules. In some instances running time studies may be needed or transit "time points" may need to be more closely spaced. Schedules should be prepared so that under normal operating conditions adherence is possible throughout the various periods of the day. Operation of schedules requires that adequate supervision be provided to obtain conformance thereto and to make field changes when unusual conditions prevail.

If bunching occurs regularly because of very close headways and these close headways are necessary to meet the public demand, then several forms of corrective action are necessary to remedy this defect. As indicated in a previous section, headways can be reduced without causing a back-up of transit vehicles if loading time is decreased. Similarly the same number of people may be moved at greater headways with fewer vehicles if vehicles of larger capacity are used. In some instances where the bunching is caused by lack of transit capacity of the roadway, then it may be essential to re-route transit vehicles to obtain better utilization of the transit capacity of existing streets.

5. *Safety*

Users of mass transportation media have a right to a high standard of safety of operation and normally such safety is expected and assumed. This factor is not inherent in operation but is achieved. Those roadway factors having a direct bearing on safety are: design features such as width, grade, alignment and transit stop facilities; safe access to and egress from transit stops by passengers; and traffic control measures for both vehicles and pedestrians. In connection with the foregoing, reference is made to ITE Recommended Practice "Proper Locations for Bus Stops." Conscientious enforcement of all traffic regulations and the application of all traffic control measures is essential to the attainment of a high degree of safety in transit operation.

6. *Comfort*

Passenger comfort is an essential component of passenger acceptance and utilization of transit service. As far as roadways are concerned, this element requires that the roadway and its traffic characteristics permit the smooth operation of the transit vehicle. An auxiliary feature is the provision of adequate waiting stations at points where waiting time is long or a significant number of passengers are involved. These facilities need not be elaborate but should be safe, clean and provide protection against inclement weather. Where large numbers of passengers use the facility, it is necessary that layout and arrangement provide for an orderly movement of passengers.

7. *Economic Considerations*

Public acceptance of mass transit service is an important economic consideration since it is reflected in patronage and in willingness to pay for the service rendered. However, in this discussion, the economics are restricted to more tangible aspects. The measure of successful financial operation is whether or not the transit system earns an adequate return on its investment and/or a satisfactory operating ratio. One measure of cost of operation is cost per vehicle mile operated or cost per vehicle hour operated. Comparable figures for analysis would be, respectively, revenue per mile operated or revenue per vehicle hour operated.

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(1) Increase average fare per passenger, provided increase in fare more than compensates for loss of patronage due to resistance to the increased cost.

(2) Increase patronage without other change.

(3) Combinations of foregoing so that product of passengers times fares results in net increase.

Of the three foregoing methods, item (2) and possibly item (3) are affected by routing of lines. Aside from factors already mentioned, patronage can usually be expected to increase as service is made available to more people. More people can be served per mile of operation if lines are routed to serve the maximum number of persons without duplication of service. Therefore, routes should serve densely populated areas and conversely should not serve sparsely populated areas, nor normally be routed closer than ½ mile to each other, nor closer than ¼ mile to physical barriers such as canals and railroad yards without adequate pedestrian crossing, nor immediately along the edge of parks or other residential voids where patronage can be drawn only from one side of the line.

Without affecting miles operated, cost of passengers carried may be decreased by increasing speed of operations thus providing the same number of seats per given period of time with fewer vehicles and permitting a decrease in amount of investment, equipment, and labor. The route selected for use and the traffic conditions thereon have a decided influence on over-all speed of operations. Routes should be selected that have favorable characteristics for fast operations.

Miles of operation may be decreased through shortening of route, the use of cut-back or shuttle service, decreasing frequency of service in accordance with lessened demand during different periods of the day or night, or use of higher loading standards. Of all of the foregoing, the shortening of routes or their designation as shuttle or feeder routes are within the realm of this study.

The economics of *branch lines* follow the foregoing considerations, but vary somewhat in their application. When a main line is divided into two or more branches, scheduling of service becomes difficult and much idle time of vehicles and operators may be the result, or else there is likely to be too little service on one portion of the route and a superabundance on other portions.

Even if service requirements are the same, then the scheduling difficulties resulting from an attempt to mesh various running times and headways are considerable, flexibility is lost, and operations are likely to be more costly. If short and long legs are involved, there is also the probability of the long leg or branch being overloaded while operating on the common trunk line. Branch lines, however, that can be economically scheduled offer a means of providing a through service and might be preferable to a "stub" branch.

The economics of mass transit routings, as we have seen, involve a matching or tailoring of service to meet riding requirements. The length of routes is an integral factor in this consideration. On short routes, service can usually be fitted to requirements so that only necessary service is provided. On long routes, requirements throughout the length of the route will usually vary. Since service provided must meet maximum needs, excess service is provided for portions of the long route; unnecessary miles are operated and cost per passenger served is increased.

(b) *Effects of Expansion*

There is a tendency to extend transit service to outlying areas as the community grows. Passengers from these outlying areas must be transported greater distances at a consequently greater cost and diminishing rate of financial return. To continue such expansion without increase in fare is to court financial disaster as has been demonstrated in numerous instances.

One might then consider the possibility of increased fare to cover increased cost of operation. If all fares are the same (flat fare), the short haul rider is charged more than necessary and the long haul rider is subsidized thereby. This process can be, and in instances has been, continued to the point where short haul patrons either walk or turn to other forms of transportation. The transit system is then left with principally the long haul riders for whom service is more expensive. Under the flat fare system, this ultimately leads to further increases in fare and decline in patronage. Such a cycle, involving long routes and flat fares, may be repeated until financial catastrophe occurs.

Let us now look at a combination of short trunk lines, or possibly express lines, which operate close to the central business district, and which are fed by feeder lines. Service on such a system can be economically adapted to the needs of the passengers. Moreover, with the almost automatic classification of passengers into long haul and short haul categories, it is possible to more nearly relate the fare to the cost of service as indicated by miles traveled. This matching of fares to cost of service is the zone fare system.

Thus we can see that as the service area is increased, the use of zone fares, used in all other forms of transportation, becomes a necessity. Therefore, in the planning of transit service to an expanded area, transit routes, especially the division of the route into segments of operation by separate

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lines, should be determined which facilitate the automatic classification of passengers into long and short haul categories for zone fare purposes.

8. *Correlation with City Planning*

It can be assumed that some form of public transportation will continue to be necessary within the foreseeable future, especially for the larger cities and metropolitan areas. It is therefore vital in planning the further development of cities that adequate provisions be made for expansion and extension of transit services. This includes local as well as "express," "limited stop," and "rapid" transit service.

In general, transit desire lines closely parallel the desire lines of local passenger trips by automobile. Therefore, the major street system, if properly designed, should be able to accommodate local surface transit. However, such accommodation too often is not provided because of the modern concept of city planning which attempts to insulate the residential neighborhood from the impact of vehicular traffic, including transit operations. This concept, in many instances, leaves a void insofar as transit is concerned since transit must be readily accessible to residential units. Moreover, street layout should be checked to insure that ready or direct access for pedestrians is available to transit stops.

All of which adds up to the conclusion that there must be at least a transit right-of-way plan and that it must be correlated with the street plan and layout of subdivisions. Close coordination among transit operators and city planners is essential to insure future operation of transit on an efficient basis.

9. *Conclusions*

In considering the foregoing, it must be borne in mind that it is not contemplated that every route be operated on a profitable basis. It is, however, believed that over-all operation of all lines must result in sufficient revenue to permit of equity money being readily obtainable when expansion of facilities is necessary. It should be remembered that the cost of uneconomic routing and operation is borne by the transit riding public. The interest of the public, therefore, demands economy in routing and operations.

What, then, are the desirable characteristics of surface mass transit routes? Summarized: —

(a) They should connect by most direct route major points of origin and corresponding destination points, principally residences and major commercial and industrial centers.

(b) They should provide reasonable facility for interchange to and from secondary centers such as high schools and colleges and neighborhood centers. (Cross town lines.)

(c) Routes should not duplicate each other except perhaps where lines necessarily converge.

(d) Through routes should not be required to serve sparsely populated areas or pass through such areas for considerable distances.

(e) Each route should normally draw its patronage from areas within not less than $\frac{1}{4}$ mile on both sides thereof, but in thinly populated or restricted areas, distances in excess of $\frac{1}{4}$ mile become necessary. However, adequate rights-of-way for streets spaced at $\frac{1}{2}$ mile intervals should be available for use where increased density of population can be foreseen.

(f) Routes selected should afford facility for rapid and safe movement of transit vehicles and must afford facility for interchange of passengers where transit lines of different destinations intersect. In this connection, savings of time through use of express routes can be realized provided higher average speeds can be maintained for comparatively long distances. Such routes must also afford opportunities for passengers to transfer. Moreover, there should be sufficient patronage to insure efficient utilization of vehicles at frequent intervals.

(g) There must be adequate provisions for turn-around at both ends of the line and for "lay-over" or headway adjustment at least at one end of the line.

(h) The combination of routes and service provided must meet public needs and over-all operations must be capable of providing an adequate operating ratio or a reasonable return on the investment required.

(i) Since lines or routes are placed to serve the needs of the people which vary from time to time (not static), planning for routes should be kept flexible, so that adjustments can be made to meet changing needs as circumstances warrant.

(j) Provision for future transit routes and pedestrian access thereto should be made in all subdivision layouts, and even these routes may not be used until sometime in the future.

(k) Design of roadways that may be used as transit routes should incorporate features which facilitate movement of transit vehicles and the handling of patrons at pick-up and discharge points.

(l) Adequate traffic control measures for the route are essential. To this end, traffic flow may be improved by making the most efficient use of existing streets. Cooperation between transit officials and traffic officials is necessary in order to obtain maximum traffic capacity of street systems and a mini-

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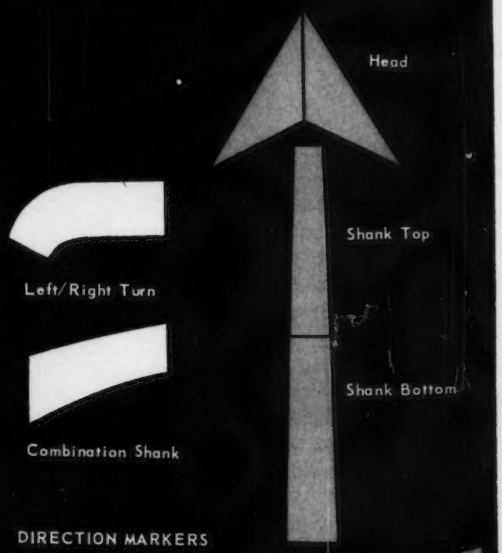

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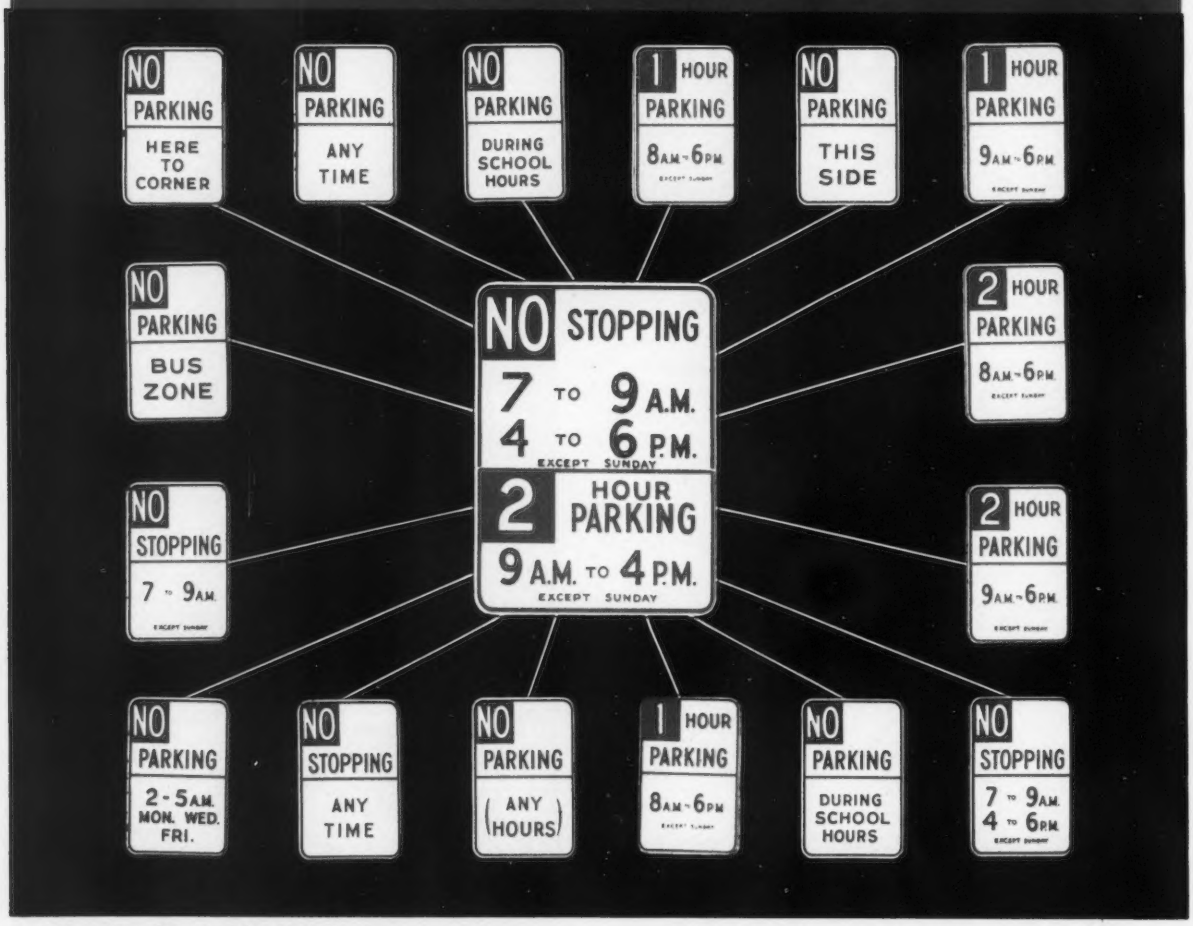
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INSTITUTE AFFAIRS

(Continued from page 588)

McMonagle Goes to Rome

J. Carl McMonagle, retiring president of the Institute of Traffic Engineers, and assistant director of the Highway Traffic Safety Center at Michigan State University, will speak at the International Concrete Road Congress to be held in Rome, Italy, from October 16 to 19. His subject will be "Expressways in the United States." Road organizations from 15 countries will be represented, and the invitation is a very real honor for the man and our organization.

Pavement Marking Survey

One of the Sustaining Organizations of the Institute has recently circulated a questionnaire to all Institute members, asking about their use of various pavement markings. The questionnaire was shown to the headquarters office before being mailed, and it was agreed that the results of the survey would make an interesting magazine article.

Because the questionnaire as distributed appears to have the blessing of the Institute, it has been decided that the detailed results would be made available to all sustaining organizations and to the Technical Council in addition to any general summary which may be prepared for the magazine.

International Traffic Police Congress as Scheduled

Institute headquarters has received a program of the International Traffic Police Congress to be held at Eindhaven, The Netherlands, from October 8 to 12, 1957. A number of sessions are scheduled which will be of interest to traffic engineers, and it is hoped that some of our members in that area may have an opportunity to attend. More details are available from the Washington office.

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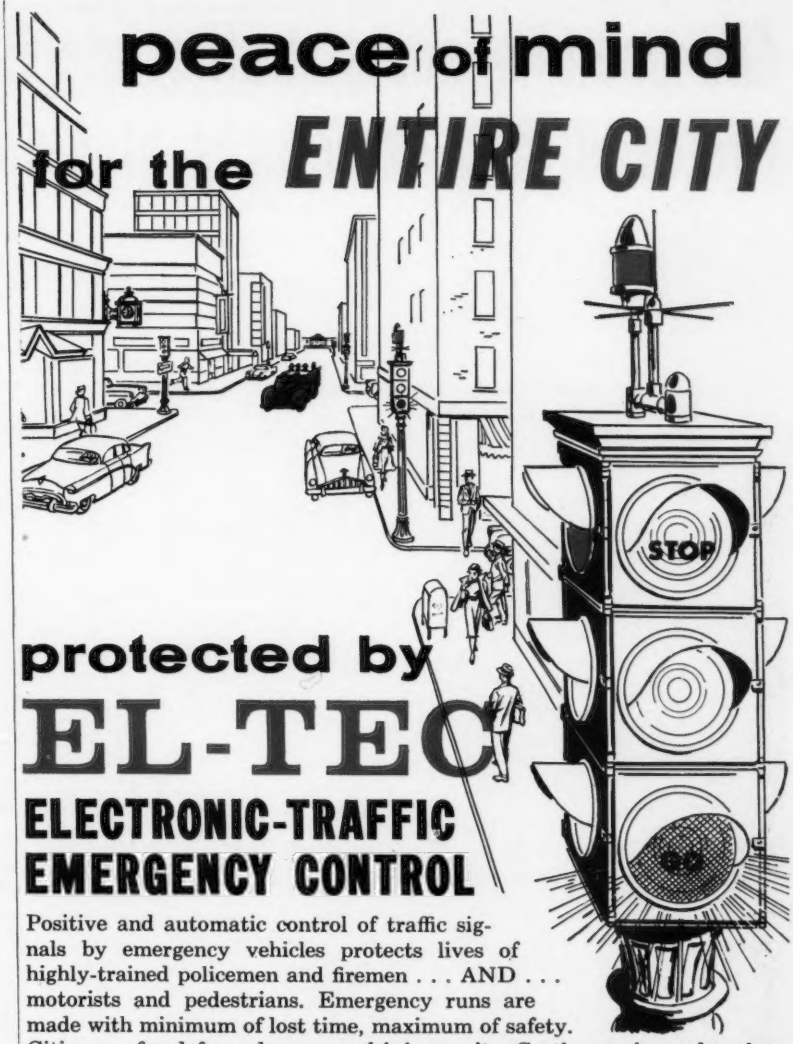

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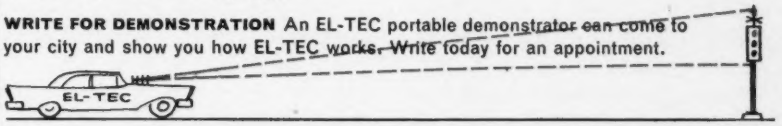

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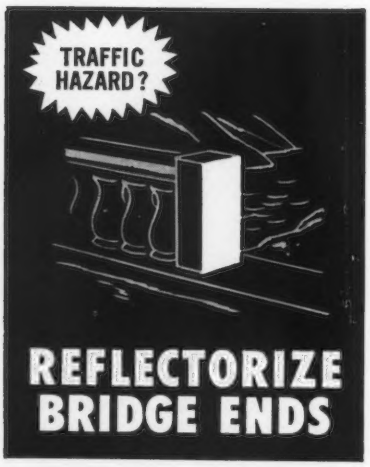

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